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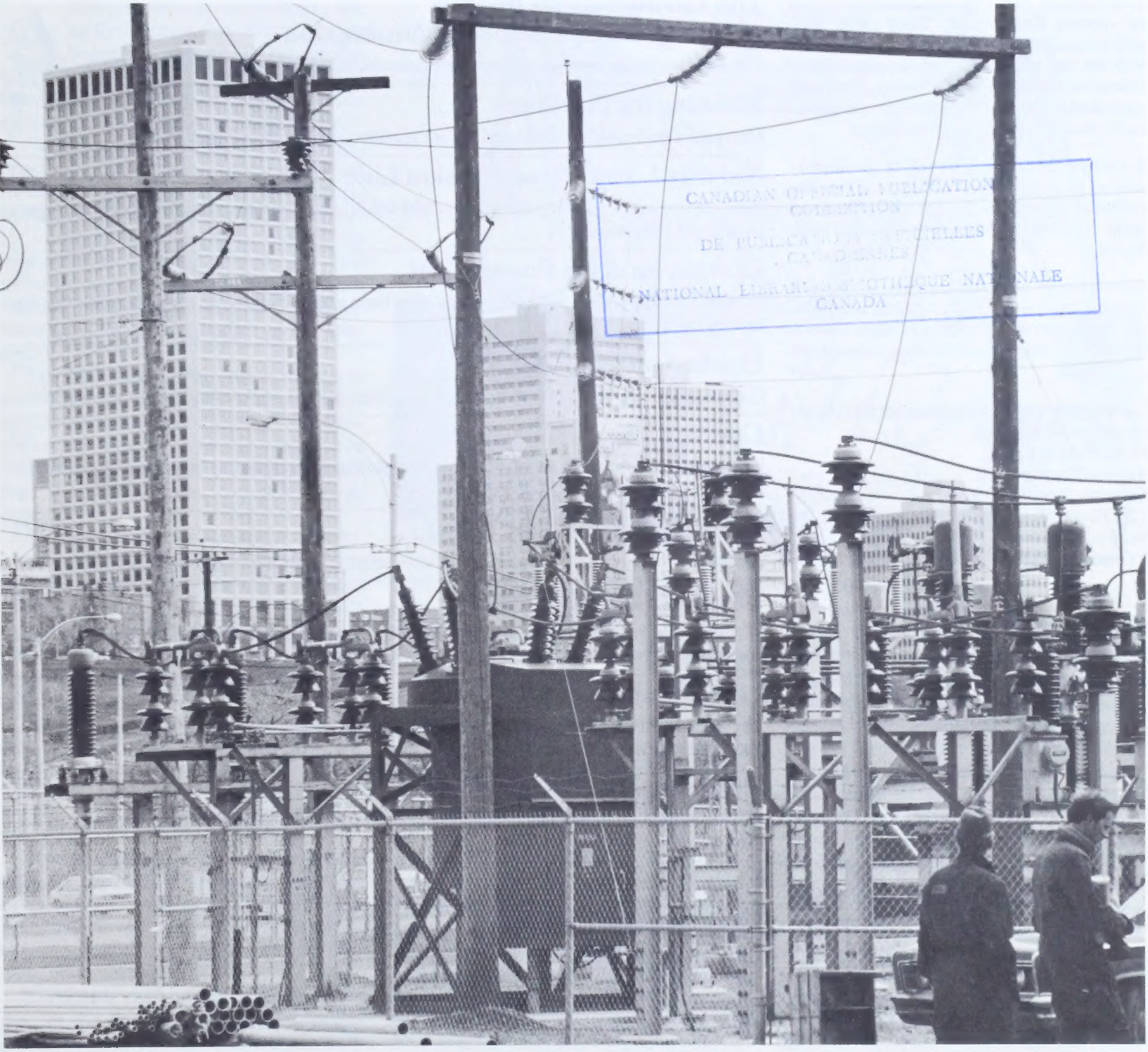

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Energy and the Environment: II

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ENVIRONMENT VIEWS

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Alberta
ENVIRONMENT

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The Environmental Impacts of Energy Distribution and Consumption

Oh yes... and we'll need electrical outlets here, here, here, here, here, here, here. here, here, here, here, here, here, here, here, here, here and here.
... and here, here, here, here, here, here, here, here, here, here, here, here and here.
HOUSE PLAN

A million years ago--according to one analysis--primitive man's energy budget was about 2,000 kilocalories a day. That's equivalent to the amount of energy released in the total combustion of a quarter of a kilogram of bituminous coal.

When he learned to use tools and fire, his energy consumption increased almost threefold. Later, primitive agricultural man, growing crops and using animal energy to supplement his own, burned the equivalent of 1.6 kilograms of coal. Still more advanced successors, using a little water and wind power and some coal for heating, increased the budget to 3.5 kilograms.

The 1875 Englishman, using the steam engine for industry and transportation, needed the equivalent of just over nine kilograms of coal a day. American man, circa 1970, was burning the equivalent of more than 31 kilograms a day to meet his energy needs.

We need energy for the work it can do. And when our own energy--as in leg power for transportation--isn't enough, we need to supplement it from other sources. The more complex our lives become, the more varied our needs and the more energy we require to make the goods and perform the services we demand.

And the more energy we need, the further afield we must go to look for it, the more extensive the networks we must devise to deliver it to our homes and work places--and the more it comes to characterize our lifestyles.

The last issue of Environment Views looked at the environmental implications of energy extraction. This issue will consider how energy, once extracted, is distributed to its consumers, and what use they make of it once they get it.

In Alberta, our main energy sources are gas, oil and electricity generated from hydro or thermal power. They are generally delivered to us by underground pipeline or overhead transmission line.

Though it's probably fair to say that the distribution of this energy has less environmental impact than its extraction and generation, there are still problems.

The major ones concern the sheer distances affected by the lines; Alberta, as the maps show, is criss-crossed from top to bottom by a complex network. For every line on those maps, the cost must be counted in trees cleared, fertile agricultural land disturbed, fisheries or wildlife habitats invaded. And--especially in the case of transmission lines--there's the question of aesthetics. The lines are ugly, and people are coming to object to them more and more strongly on that score alone.

Alberta Environment has been promoting the use of utilities corridors--such as those now in place in Edmonton and Calgary--for many years. The provincial department of energy and natural resources is now giving some serious thought to using them in other areas too. By limiting lines to specific areas, the corridors help lessen environmental damage.

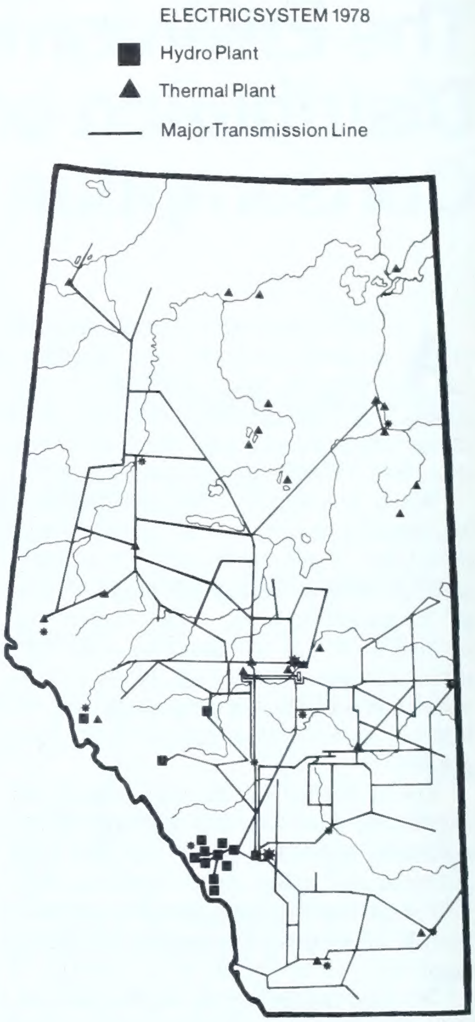
For now, though, the effects of pipelines and transmission lines, rather than being concentrated in one area, are spread thinly over thousands of kilometres.

One of Alberta Environment's tasks is to attempt some assessment of environmental impact before line construction is even approved. In the case of pipelines, applications are submitted to the Energy Resources Conservation Board (ERCB). If the proposed pipeline will have a significant environmental effect, the application is referred to the department's land reclamation and conservation division. The division operates a referral system which allows other departments and agencies--like those involved with fisheries, wildlife, forests, water quality and so on--to have input where relevant. Conclusions about environmental impact based on all the input must be taken into consideration before an application can be approved. (This process, and some specific effects of pipeline development, are discussed in the article on Page 7.)

A similar procedure governs transmission line applications. But according to

The Seebee hydro plant.

ALBERTA GOVERNMENT PHOTO



Ralph Dyer of the land reclamation and conservation division, utilities companies wanting to build major transmission lines are tending to plug into the referral system before a formal application is ever made to the ERCB.

Most projects, Dyer says, can be arranged to the satisfaction of all the interests involved. This is especially true of transmission lines proposed for low-population areas.

But individuals are coming increasingly to realize that they too have interests to represent.

"In the last year or two we have seen a rise in the degree of public concern over power lines--and correspondingly a rise in the number of interventions by the public against applications," says Dyer.

A classic example of such public concern was the recent hearing by the ERCB into an application by Calgary Power to build a transmission line from Keephills, 60 kilometres west of Edmonton, to Ellerslie, just south of the city. The story of that application, and the various interest groups that protested it, is told on Page 10.

Transmission lines and pipelines are needed when consumers live some distance from the centres of extraction and generation of energy. But it's instructive to consider that having the energy produced on the spot, though eliminating the need for elaborate transmission networks, does pose other problems.

The Rossdale power plant is located almost in the heart of Edmonton, on the banks of the North Saskatchewan River--right in consumer country. It creates concerns about toxic emissions from the chimneys which rear their heads incongruously against the city skyline, and about the waste heat from its operations which discharges into the river. (More about the plant, its drawbacks--and its potential--appear on Page 12.)

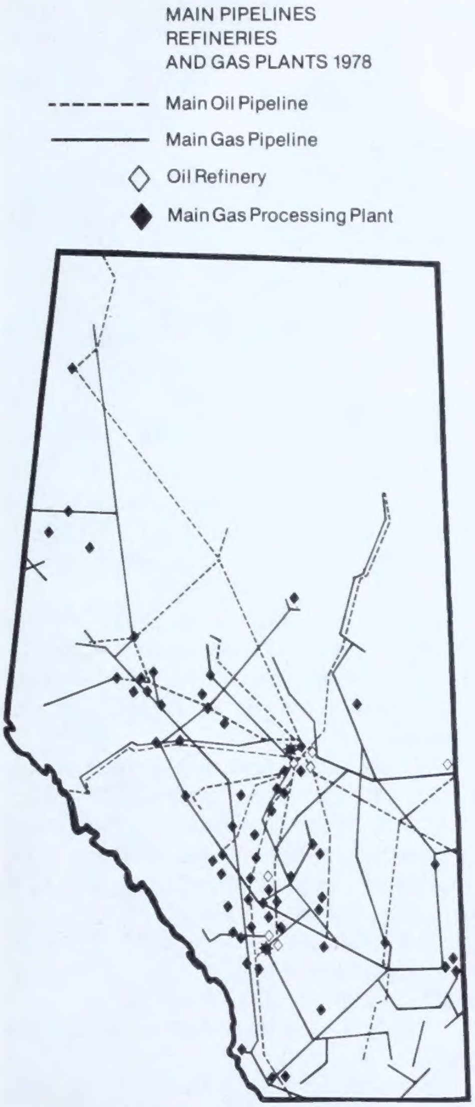
But however strongly we may feel about power plants in our cities, transmission lines scarring our landscapes, pump jacks rearing their heads in every other field, the fact remains that they're all there because we the energy consumers have needs which they are meeting.

We've lived, at least until recently, in a society where energy resources have seemed unlimited. And we've exploited them without remorse, almost without reflection.

It seems, too, that there's no going back. The ERCB estimates that Alberta's annual energy use will increase nearly four-fold in the next 20 or so years. That energy may cost us dear.

It's a law of thermodynamics that when we convert energy in order to get its work benefits, we lose some along the way. There's a heat loss when coal is used to generate electricity; there's heat lost when that electricity lights an incandescent bulb in the living room. We also lose the energy we squander--by leaving television sets on unwatched, leaving cars running unnecessarily, and so on.

In a 1975 Science Council of Canada background study on energy conservation, Fred Knelman writes that more than 50 per



cent of all the energy supply in Canada is discarded as waste.

We pay for that waste, in terms of the oil wells and hydro dams which have to be brought into operation to supply it. And we pay, more and more, to achieve environmental quality while all this energy consumption is going on.

Knelman quotes statistics from the federal department of energy, mines and resources which suggest that, between 1973 and 1983, we'll be spending $8.5 billion on pollution control.

Concerns about energy supply are only now drawing attention to the waste problem. The 1973 oil crisis, as well as bumping up fuel costs, initiated some serious thinking about our dependency on non-renewable fossil fuel sources, and led to conservation efforts.

Energy conservation and environmental protection go hand in hand. Obviously, the less energy we use, the less environmental damage--from oil wells, hydro dams and so on--we are likely to incur, and the less we are likely to pollute the atmosphere with noxious emissions and waste heat.

And there's no escaping the fact that energy conservation is catching on because it saves money, too. The barrel of oil saved by careful energy management is cheaper than the barrel from the ground. It's just poor economics, also, to pay for something--like a surplus of lights in a building--that nobody really needs.

The fact that energy conservation *is* catching on is apparent from activity in every sector of life. The department of energy and natural resources has instituted the job of energy conservation manager in its resource information services. Incumbent Ian Burn is developing information programs on energy conservation and efficient energy use directed particularly at homeowners and school students. He also works in liaison with other government departments to help develop conservation programs in other areas too. An example is the project developed by the provincial department of education, described on Page 21.

Industrial energy consumers and other big users are setting up energy management programs like those discussed on Page 18. And homeowners are learning that thermostats turned up too high, uninsulated basements and excessively packaged foods are enemies to be eliminated. (See the story on Page 14.)

All these efforts are having an effect. The ERCB, charged with keeping account of the province's energy consumption and estimating its future requirements, notes in its September, 1978, report on Alberta's energy requirements between 1977 and 2006 that energy conservation effects will likely be modest over the next five years, "largely because of public attitudes and lack of economic incentives." But "beyond that time the province should see measurable improvements in the efficiency of energy use."

"The Board believes the factors most likely to contribute to long term gains in the efficiency of energy utilization are real changes in the price of energy, the implementation of regulatory standards affecting end-use, introduction of economic incentives, an education program to change public attitude towards the conservation ethic, and development of a climate encouraging the structural and technical capability to service the needs of increased conservation. It is evident that gains in some, if not all, of these areas are currently being made."

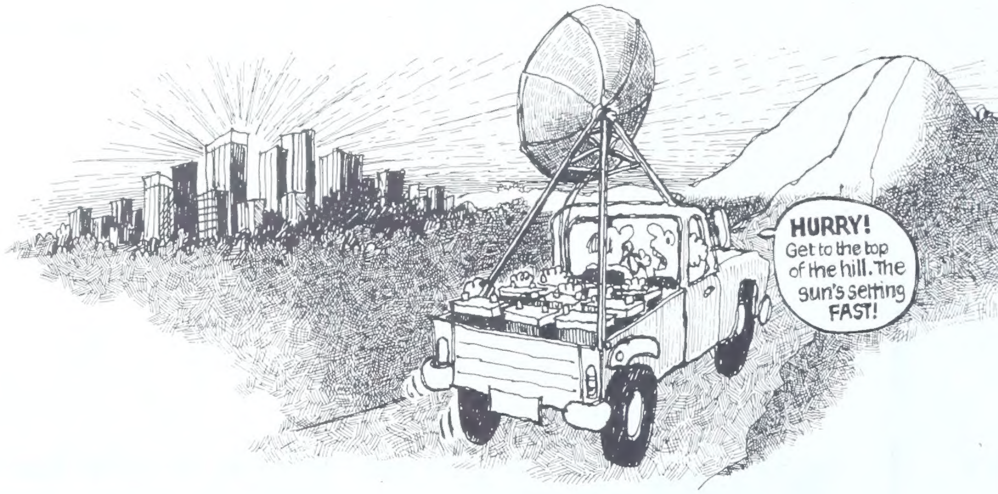
The Board estimates the total impact of conservation on Alberta's future energy requirements to be some 14 per cent by 1991 and 16 per cent by 2006.

But what are these conservation measures really doing? Clearly they're not eliminating our need for more and more energy. By cutting back on what we waste, they are, however, slowing the growth of our energy consumption. And that buys us some extra time.

We need that time to consider future options in an era when the non-renewable energy sources on which we have always depended are diminishing.

Environmentalist Bruce McCallum writes: "It is a coincidence that we have only just begun to realize the dangers of powering our economies with fossil fuels at a time when the era of energy abundance has abruptly drawn to a close. We are contemplating what to do now as we look forward to an era of energy scarcity. Canada and virtually all other nations are reacting to the challenge in a very conventional way. We define the energy crisis very narrowly, seeing it only as a problem of shortage of supply. The simple answer we are pursuing is to increase the supply. This is basically a set response--attempting to solve a problem in the way we have always done. The scenario in most countries is to expand fossil fuel production in the immediate future and to accelerate the transition to nuclear energy. Growth in consumption is to continue, in some cases at moderately reduced rates of increase.

"There are many serious problems with this approach. To date we have obtained our energy from the cheapest, most readily available sources. Now we must drill deeper


HURRY!
Get to the top of the hill. The sun's setting FAST!

wells, go to more remote sites (the Arctic, James Bay, etc.), transport farther, and upgrade low concentration fuels (uranium, oil shales, tar sands), to meet our growing energy demands. While we may be able (for the present) to increase the total energy produced each year, an increasing portion of that energy is used up in getting the energy. Often relatively cheap and accessible energy resources are used to extract more costly reserves. The Athabasca tar sands provide a good example of this problem. Natural gas from Alberta fields is being used to generate electricity and heat for extracting the oil from the sand. This energy subsidy greatly reduces the net energy produced."

David Brooks and Diane Becket echo McCallum's concern in an article on "hard" and "soft" energy policy in a recent issue of the environmental magazine Probe Post.

A "hard" policy, they say, means continuing and perhaps even increasing dependence on non-renewable fuels. It entails "heroic effects to develop and exploit oil sands, frontier gas and oil, nuclear power and coal reserves." A "soft" energy policy, on the other hand, supports a gradual shift to and increasing dependence on renewable fuels. It's an option which, they say, minimizes environmental disruption, resource depletion and pollution. It also has significant social implications.

Which route will Alberta follow?

ERCB predictions indicate that, though gas production is likely to decline between now and 2006, there will be increased development of the tar sands for oil. Coal and hydro development will also likely be accelerated. (The articles on Pages 23 and 27 give more details of such developments, and their impacts.)

No mention is made, so far, about nuclear power for Alberta.

Fred Homeniuk, head of the ERCB's hydro and electric energy department, says any reference to the development of nuclear power in the province by the utilities companies suggests that it's a possible option, but not a likely one, before the end of the century. It doesn't yet enter into ERCB forecasts for electricity generation at all.

So Alberta seems headed--minus the nuclear factor--along the "hard" energy policy route.

"We are taking the hard option--and I don't think it's at all surprising," says Les Cooke, executive director of the department of energy and natural resources resource evaluation and planning division.

"We have the proven resources. So it's understandable that we don't want to venture into the unproven too rapidly. When you look at Alberta's complete resource scene--heavy oil, coal, hydro--we *have* the hard option...

"I'm not sure that people actually make these choices. Perhaps it's only when you don't have the hard option that you look to the soft."

But Cooke adds that if, in proposed development, Alberta is taking the hard policy route, in planning the soft option is not being neglected.

The department does have, albeit recently, an energy conservation function built in. And some of its research programs are focussing on renewable energy alternatives.

Doug McDonald, the department's manager of research programs, notes that there is certainly a research emphasis on the oil sands, on methods of enhancing oil recovery, and on coal development.

But at the same time the Energy Resources Research Fund, which the department administers, is funding projects related to solar, wind and biomass energy, with SWERP--the Solar and Wind Energy Research Project, described in the last issue of Environment Views--as its major effort. It's still a small percentage of the research budget.

"We haven't abandoned the idea of renewable energy," McDonald says. But the hard facts do remain: solar, wind and biomass energy just aren't economical in a province with Alberta's present resources of fossil fuel.

Should we continue to judge energy forms in purely dollars-and-cents terms, though? What about environmental and social costs? It may be painful and difficult to change our criteria.

As McDonald says, our whole way of life to date has been based on letting the more competitive product take over from the less competitive one. Renewable energy sources will become attractive to us when they cost less money, not before.

McDonald also points out the difficulties in considering hard and soft options in black-and-white, either-or terms.

"All BTUs are not created equal," he says.

"They do come in different forms and are more or less useful. I cannot conceive how anybody could drive a car based on energy from the sun, whereas they could use it to heat their homes."

Perhaps it just isn't possible to eliminate all of our long-established needs for "hard" energy; perhaps there are good grounds for working towards a mix of hard and soft options in the future.

On the other hand, Brooks and Becket in their energy policy article do see the alternatives as mutually exclusive. It's not, they say, that you couldn't have solar reflectors and nuclear power plants standing side by side. It's simply that the two alternatives imply two radically different types of society. The society that could be bothered to build the solar reflectors wouldn't countenance the nuclear reactor, and vice versa.

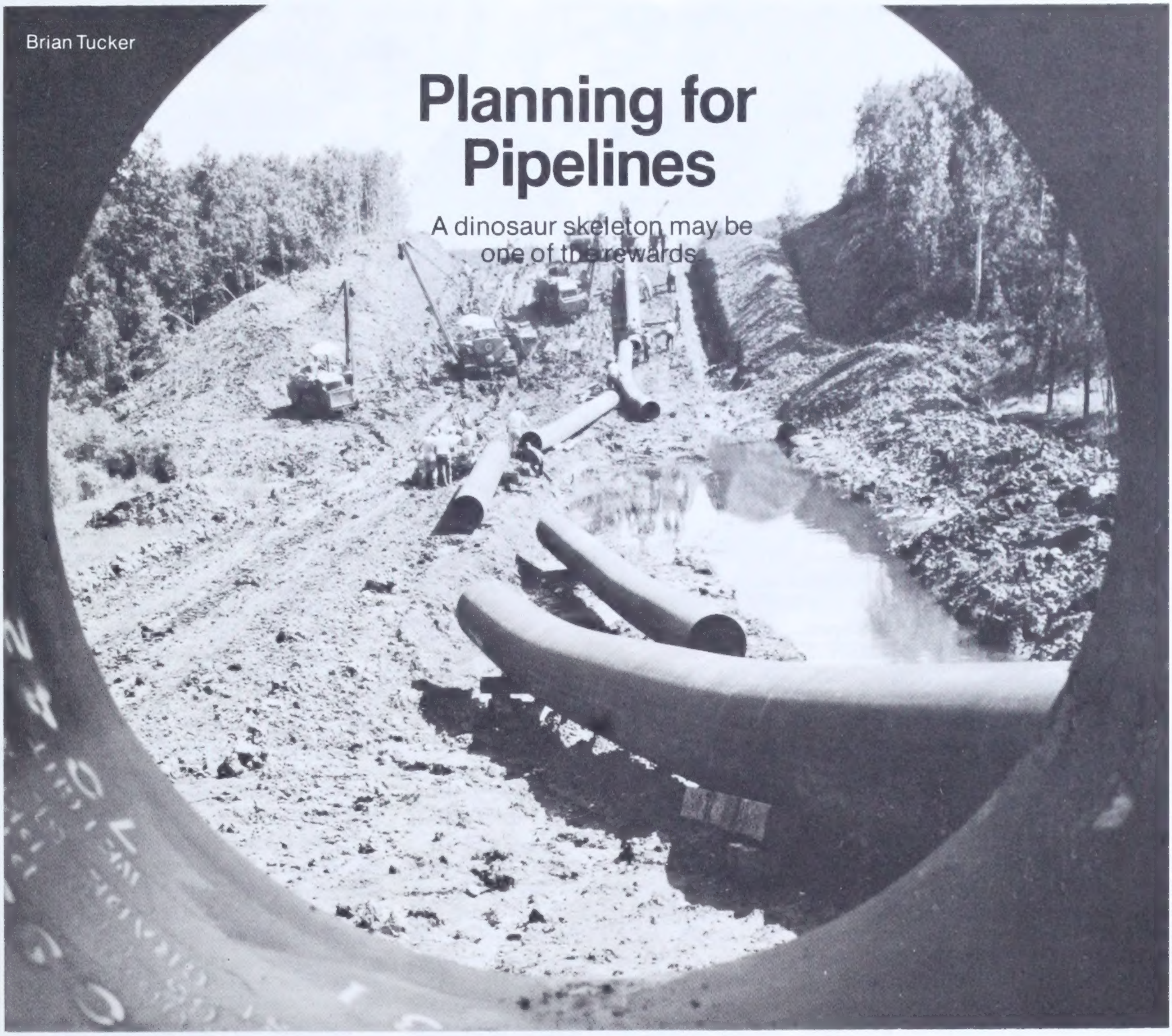
Some of the hazards likely to ensue from Alberta's "hard" energy future are already apparent, and causing concern, as the article on Page 29 indicates.

But we may not care for the all-soft option either. There are clearly some big decisions waiting to be made.

Brian Tucker

Planning for Pipelines

A dinosaur skeleton may be one of the rewards.



ALBERTA GOVERNMENT PHOTO

Round up your kids, shut off the gas and electricity and get out. Now.

A pipeline leak has turned your neighborhood into a massive time bomb that could be set off by any small spark.

The memory of that warning broadcast over the radio is likely burned into the brains of about 20,000 residents of the Edmonton subdivision of Mill Woods, forced to leave their homes March 2 when a ruptured propane pipeline caught fire and gas seeped into the area's sewer system.

Most residents had probably never known a pipeline corridor ran under their rumpus rooms. Nor had they cared much.

Their unconcern is justifiable.

Pipelines have an impressive safety record; it's a rare case indeed that creates problems like those in Mill Woods.

The fact that this is so is at least partly because of the great attention given to each pipeline application before construction begins.

Concerns about pipeline routes are raised almost daily in the province by archaeologists, wildlife officials and landowners. Their concerns centre on the damage caused during pipeline construction.

Alberta's booming oil industry keeps those people busy. Last year, the Energy Resources Conservation Board (ERCB) received about 2,600 applications for pipelines ranging from 15 metres to 160 kilometres long.

Archaeological sites are daily threatened with obliteration by pipeline construction. Most of the prehistoric artifacts are within 15 centimetres of the surface, leaving them vulnerable to any construction work.

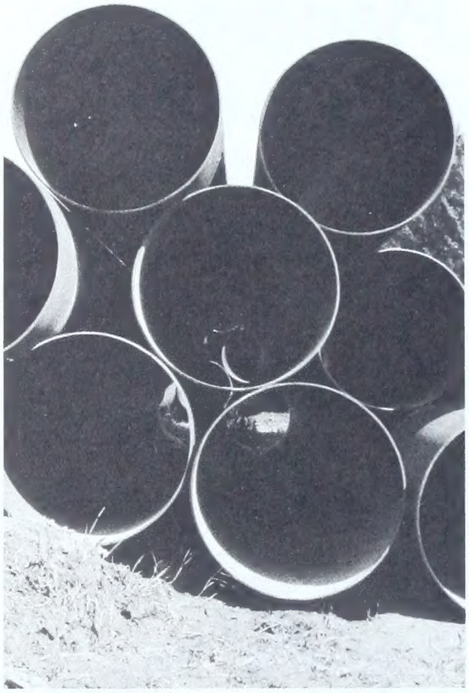
"One swipe of a caterpillar blade is enough to destroy a site," says Dr. William Byrne, director of the Archaeological Survey of Alberta.

Artifacts are protected as another natural resource. In fact, there is even more reason to be especially careful with archaeological sites, says Byrne. Most sites are half a hectare or less, but some are so large "we don't know where one starts and another ends."

"Think of the total story as a single book and each site is a page. If you're missing many pages, you may still be able to understand the story but parts of that story will be unexplainable. Once the site is gone, you can't rebuild it."

Archaeologists are detectives of prehistory. Like Sherlock Holmes, they need clues to piece together the story of how early man lived. Alberta's earliest inhabitants

Banister pipeline construction in the Slave Lake area (right).



are a particularly difficult case. To explain their complex seasonal movements, every clue is precious. And they left few of them, says Byrne.

The law protecting artifacts--the Alberta Historical Resources Act--has teeth. Offenders may be fined $50,000 and sent to jail for a year. But no pipeline construction firm has even come close to being fined for breaking this law, says Byrne.

Every development must be analysed for potential archaeological value. Developers are required to spend the time and money to have these studies done before any construction is started. And not just anyone can mess with a site. Permits are only issued to professional archaeologists, who generally must have at least a master's degree and extensive experience in relevant archaeological work.

Last year, pipeline projects made up about a third of the 110 to 120 permits issued by the Archaeological Survey to archaeologists hired to do surveys.

The ERCB only refers major pipeline projects to the survey. In some cases, field studies aren't needed, because archaeologists can work from maps showing known areas of archaeological interest. And in fact pipeline activity has proven to be a boon to the unearthing of new prehistoric evidence.

Byrne estimates about 500 sites have been found in the last two years through surveys for pipeline firms alone. One such survey in 1977 turned up an important dinosaur find near the Red Deer River in the Badlands area. At that time, it was the largest dinosaur skeleton dug up by the provincial museum in its 10-year history--a half-skeleton of a duck-billed dinosaur about nine metres long and 4 1/2 metres tall.

Broken carnivore teeth were found in the skeleton, suggesting large meat-eating dinosaurs ate other large plant-eating dinosaurs such as the duck-billed.

It showed an aspect of dinosaur ecology suspected for a long time but about which there was not a lot of hard evidence, says Philip Currie, curator of paleontology at the museum.

The find was on a proposed pipeline route but Dome Petroleum moved the pipeline around the site, he says.

Pipeline firms have been eager to co-operate, says Byrne. Most pipeline projects aren't delayed at all by the site survey. In some cases, firms have the survey done a year or two before construction begins.

Many pipeline firms are used to dealing with the requirements by now, says Byrne. However, the Archaeological Survey still has a major education role to play, because many of the smaller firms haven't encountered the law before.

Alberta Environment's land reclamation and conservation division helps to ensure that other interests affected by pipeline construction are not overlooked. It operates a referral system which allows input from other government departments and agencies where necessary on pipeline development applications. About 20 per cent of applications referred from the ERCB need more study.

The impact of a pipeline on wildlife is one of the issues addressed by this system.

Timing and location of pipelines are crucial concerns of wildlife officials, says Bruce Stubbs, a wildlife habitat protection biologist in the department of energy and natural resources. They are especially worried about big game animals being bothered in their wintering areas.

During the wintering season--generally between Dec. 1 and May 1--the animals are relying on the fat reserves stored up inside their bodies to get them through the winter and they're in a weakened condition.

If harassed, their heart and breathing rates jump and they burn up energy. Pregnant animals may abort if they're put under prolonged stress. Pipeline activity may also scare them out of certain areas. And these animals need all the space they can get to gather food in the winter.

People wrongly assume animals simply find new areas when their traditional habitat is destroyed, says Stubbs. "Elk and mountain sheep may have been returning to the same area for generations. When a familiar area is destroyed, they don't know where to go."

The actual digging of a pipeline may destroy habitat. But a greater concern is service roads that open up inaccessible areas to hunters and hot-rodding owners of recreation vehicles.

Each animal has a certain time of year it should be left alone. Like humans, animals want privacy when they mate. Mountain sheep, for example, mate in October. Dancing grounds where sharp-tailed grouse go through their mating dance should be avoided for two or three weeks in late spring.

Waterfowl may also be threatened. Development near nesting areas should be delayed until birds just born can fend for themselves in the water. If eggs are destroyed too late in the year, the hen may not nest again to replace the ruined eggs.

These concerns can be accommodated by jockeying work schedules and proper management of rights of ways. Firms are urged to hide access roads to rights-of-ways by planting trees or zig-zagging the access.

Pipeline construction is also a significant concern to fish biologists. Development can disturb river banks and bed, adding a heavier load of sediment than the river can carry.

This extra sediment smothers the fish eggs and small fish living on the river bottom. Salmonids, which include trout, grayling and whitefish species, are particularly vulnerable to this threat.

It can also scrape away algae and kill tiny

ALBERTA GOVERNMENT PHOTO

invertebrates such as insect larvae highly sensitive to sediment.

No single pipeline development is likely to cause this much damage, says Roger Everett, fisheries habitat biologist with the energy and natural resources department. But an accumulation of pipeline, road, transmission line and other projects can. By changing the construction schedule and using the different techniques of piling excavated dirt that doesn't block fish swimming upstream, many problems can be avoided, says Everett.

Because most fish like cover--logs, branches, stones--their numbers can be limited by removal of this material during construction. However, pipeline firms are encouraged to return the stream as close to its original condition as possible.

Fisheries officials have the authority under the Fisheries Act to inspect pipeline construction sites and have the power to lay a charge. They get referrals on major pipeline projects and can attach conditions to the pipeline permit to protect fish.

Farmers' biggest problem in pipeline matters is ignorance of their rights, says Bard Haddrell, assistant Farmers' Advocate of Alberta.

"Farmers are becoming better informed...They realize they have rights and they're demanding them."

The pipeline firms play by the rules but they may not be explaining all the rules to farmers, he said. "They're not lying, they're just not putting all the information forward."

The office was formed five years ago by the provincial government to help farmers with problems and complaints. Last year, it dealt with roughly 2,600 inquiries, including about 1,000 about pipelines. Most of these were handled easily.

Pipeline construction can be a great inconvenience that a farmer must farm around, Haddrell says. Any disruption in the farmer's schedule can be costly and annoying. But normally, the construction firm will provide access if the farmer asks for it.

If a poor reclamation job is done, farmers will lose money through reduced crop yields. The firm must take care to replace topsoil in the same order it was removed so that subsoil isn't mixed in.

A cash settlement is often offered to the farmer to compensate him for lost income, absolving the pipeline firm from responsibility in the future. Many farmers, thinking the reclamation job will be easy, take the cash. But farmers fail to realize the difficulty of restoring soil to its original state--it can cost $8,000 for less than half a hectare.

"To most people, it's only dirt--but soil is very delicately balanced. We advise farmers not to just look at the money--look at the terms. A bad contract can wipe you out just like a hailstorm."

In most cases, however, land disturbed by pipelines is reclaimed properly. Although landowners have input into where the pipeline can go, the ERCB has the final say. In about 90 per cent of cases, landowners and firms agree privately on compensation for use of land. But when they can't agree, the Surface Rights Board is called in.

The board holds hearings in an informal way, often out in the farmer's field with no judges or lawyers present. This informality puts farmers more at ease and they give better evidence, says Ed Shupenia, board secretary. And the board members understand the farmer's problems--all of them have had some background in agriculture.

The board's decision is binding on both parties, but an unhappy farmer or firm can appeal the decision to court within 30 days.

Federal legislation comes into play for inter-provincial pipelines (such as the Alaska Highway gas pipeline). It sets out more formalized procedures which are more likely to involve court action, costing the company more money and taking up more of the farmers' time, says Haddrell.

What input does the public have into decisions on pipeline routes? Public notices are printed in newspapers on major pipeline projects.

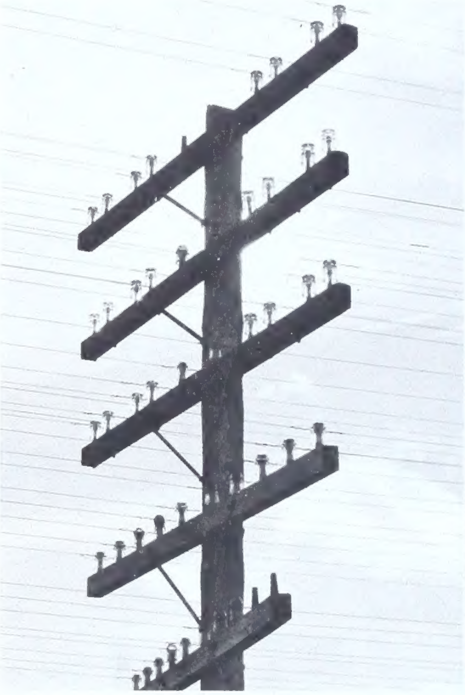
Most concerns can be resolved by providing information, says John Maloney, supervisor of permits and licences for pipelines with the ERCB. But if there is direct opposition to the project or the landowners and the firm can't make a deal, the board will call a public hearing at which firms and landowners can present their cases. Last year, about 20 hearings were held.

Brian Tucker is a journalist in Edmonton.

Maryhelen Vicars

Nobody Loves a Transmission Line

"It's a matter of deciding where it would have the least impact."



ALBERTA GOVERNMENT PHOTO

High voltage power lines may be a necessary part of our energy system, but nobody wants one for a neighbor.

That's the story that emerged when Alberta's Energy Resources Conservation Board (ERCB) held hearings this spring into a proposal by Calgary Power for two 500-kilovolt power lines between a new 750-megawatt coal-fired power plant at Keephills, 60 kilometres west of Edmonton, and a substation at Ellerslie, south of the city.

Matt Hawkins, of the Edmonton office of Calgary Power's public affairs department, says the new plant, and the lines, are necessary because of increased residential and industrial demand for electricity.

Over the past 10 years, consumption has increased by about 10 per cent a year, and in the future seven- to eight-per-cent increases are likely, Hawkins says.

Calgary Power has three possible routes it could use for the lines, and wants to build on two of them, at a proposed cost of $35 million, including the cost of the substation. Although both lines could be run on one pathway, company engineers say it's better to have the lines separated, so if weather or an accident takes out one, the other is less likely to be damaged.

Of the three alternatives, north (along an existing route which has two 240-kilovolt lines), central (cutting through residential subdivisions and a nature sanctuary) and south (passing one mile south of the town of Devon), the company would prefer to build one line in the north and a second along the central corridor.

Laurence Murgatroyd, manager of regulatory applications for Calgary Power, says this plan is least disruptive of agriculture, and is also the least expensive (by $1.5 million) combination.

But it's not a popular one, judging by the reaction of the individuals and groups who submitted more than 70 briefs to the three weeks of hearings. Nobody wants the mammoth towers near them. They're 32.6 metres high and are nine metres wide at the base, not easy for anyone living or playing nearby to ignore.

Among the concerns raised at the hearings:

- The University of Alberta board of governors says it will cost up to $20 million to relocate its research station at Ellerslie which would be threatened by the lines. This would mean valuable experimental work would be disrupted or destroyed, the board's submission said. The university's weather satellite would suffer "serious interference" from the lines and its work in forecasting for the oil drilling operations of the Beaufort Sea would be hampered. The governors also warned that the lines would cut through specially protected animal and bird research areas at the research station. Opening the area up could introduce disease, ruining carefully controlled zoological studies.
- The centre line would run along the border of the Clifford E. Lee Nature Sanctuary and pass close to the Devonian Botanical Gardens, which supporters of these projects say would ruin their appeal to the public.
- The CBC French language radio station could be "forced off the air," a CBC engineer says, by interference caused from towers on either the southern or northern routes passing close to the station's transmitters.
- High voltage lines interfere with the ability of bees to communicate with each other, a fact which has at least one local beekeeper upset. Without communication ability, he says, the bees can't work together to produce honey.
- Although western authorities dispute their findings, Soviet studies show that strong electromagnetic fields near high voltage lines can cause people to suffer from fatigue, headaches and sexual impotence.
- The southern route would come so close to Devon the town's growth would be hampered, its manager told the hearings. This would push up the cost of development in the area.

Some of the most vocal opponents of the chosen route were acreage owners, people who moved to the country to enjoy the outdoors, a way of life which they see threatened by large power line developments passing near or through their property.

Lorne Proudfoot of the Parkland Acreage Owners' Association says members are strongly opposed to the centre route which passes through much of their property. While they're concerned about the safety of the lines passing close to their homes, it's the aesthetic and environmental concerns of the development which worry them most.

"This area has large numbers of birches, pines and aspens. This would ruin an area that is just beautiful," Proudfoot says. "On either the northern or the southern route there are fewer trees, although there are some farms. But on a farm you can crop or graze around the towers. An acreage is much more intensely used for recreation, for cross-country skiing or berrypicking, for example."

Kathy Sinclair of the Woodbend Residents' Association says her group is most concerned about ecological damage to the Woodbend acreage subdivision area, which the centre line would run through.

The land is unique to the Edmonton area. Called a sand heath, it is a small area

Wildlife habitats in the Clifford E. Lee Nature Sanctuary could be affected by the proposed transmission lines.

LAUREN DALE

of a type of vegetation more common to the Alberta foothills: sand with a thin layer of humus supporting a growth of pine. It is relatively unspoiled, Sinclair says, with the houses placed "with great care to retain the beauty of the area."

"It's one of the few beautiful natural areas around Edmonton," she says. "I think a large city needs areas around it of greenery and wildlife; it's important for people in the city as well as those who live out here. Once it's gone, you can't reconstruct an area like this."

The ecosystem is a delicate one: once disturbed, it soon reverts to bare sand, which is open to erosion and difficult to seed, except by noxious weeds. This raises the prospect of the 36-metre-wide right-of-way either drifting sand or filled with weeds which might have to be controlled by herbicide spraying. "I don't think most people are happy to see spraying around where we live," Sinclair says.

The Clifford E. Lee Nature Sanctuary is also located within this system, in what naturalist Dr. Ross Hodgetts calls "an ideal location."

"It's inconceivable that we could find this desirable mix of geographical and biological features anywhere else in the Edmonton area."

Either of two variations to the centre route would border the 56-hectare sanctuary, which was established about a year ago. It was designed to provide both educational programs for school children and a sanctuary for the observation of wildlife, including the waterfowl which would use the sanctuary's 36 hectares of water.

The line would "effectively destroy the sanctuary," Hodgetts says.

"Its main appeal is that it's a natural environment," he says, an appeal that would be destroyed by the presence of huge transmission towers on a wide swath of cleared land. There is also a danger that birds migrating to and nesting on the site would be killed in collisions with the line, Hodgetts says.

One of the reasons cited for Calgary Power's preference for the central route rather than the southern one is economic, a reason which Sinclair says is based on outdated information.

In calculating the cost of land which would have to be purchased, the utility company is using two-year-old figures which don't reflect the inflation which has pushed per-hectare costs from $800 or $1,200 to about $4,800 in the meantime, she says.

She also says the company did not seem to have calculated the extra cost of building its line on a sand heath, where numerous swamps make it necessary to use deep pilings and do much of the building work in the winter; and where much of the heavy underbrush would have to be hand-cleared. These differences, she maintains, could remove any cost advantage to the central route.

Sinclair refutes the other reason for the choice given by Calgary Power; their desire to preserve farmland. The sand heath is useless for farming, she says, but it "has great potential for housing development."

"People are always going to want to build in the country. If this land is not available, they will move on to farmland. Someone will always sell to them. In the long run you would lose more farmland that way than by allowing the line now to run across agricultural land."

Several of the intervenors, including the Woodbend group, questioned the need to have two separate rights-of-way, although they agreed that two lines should be built to provide for future needs.

Sinclair says her group was unconvinced by Calgary Power's arguments of needing the extra security against mishaps such as plane accidents or severe storms, because the company failed to back them up with statistics. The Woodbend group favors an alternative which would see both lines along the northern route, an existing energy corridor. That's an alternative which Proudfoot says is in line with County of Parkland long-range plans for the area. Their second choice would be a combination of the northern and southern routes. "There's no way around it, a power line is going to be detrimental. It's a matter of measuring it and trying to decide where it would have the least impact."

This measuring job is now up to the ERCB, which is considering the submissions. It is unlikely a decision will be made much before the fall of 1979.

Maryhelen Vicars is a journalist in Edmonton.

Stephen Tyler

Downtown at the Power Plant

Waste heat could help warm a city's core.

LAUREN DALE

Located in the heart of Edmonton on the banks of the North Saskatchewan River, Edmonton Power's Rossdale generating station is a prominent reminder of the primary source of electricity for all Albertans. Thermal power plants, burning coal, oil or natural gas, supply us with over 90 per cent of our electricity.

Very few of these plants are situated in cities, because of the environmental disturbance and large site area that a huge power plant entails. But the location of the Rossdale plant gives Edmonton Power an opportunity to demonstrate methods of more effectively and efficiently using our fossil fuel resources.

Because of the size of the Rossdale generating station and its conspicuous location in a river valley being increasingly devoted to recreation and open space, the environmental effects of the plant are of particular concern.

A large thermal power plant produces two major types of environmental disturbance directly through its operations. Burning large volumes of fossil fuel, to produce high-temperature, high-pressure steam used to drive the plant's turbines, releases undesirable exhaust gases into the air.

The Rossdale plant, because it uses natural gas as a fuel, has relatively clean exhaust gases with virtually none of the particulates and sulphur oxides which result from the burning of other types of fuel. Because of the high combustion temperatures and efficiencies, carbon monoxide levels are also very low.

However, the plant does produce oxides of nitrogen (NO_x), atmospheric pollutants which can increase the risk of severe respiratory ailments. NO_x levels are monitored at Rossdale in the exhaust gases of its largest boiler units and at ground level in Queen Elizabeth park on the opposite side of the river. Alberta Environment records show that during 1978, ambient ground-level NO_x concentrations at this site twice exceeded the maximum provincial standards set by the department. However, because NO_x is also a component of automobile exhaust gases, and because measurements of automobile pollution indicators were also high on these occasions, it is difficult to say how much of the blame can be pinned on the Rossdale plant's exhaust gases.

The plant's contribution to NO_x levels in Edmonton's air should be reduced in the near future as Edmonton Power introduces new exhaust gas recirculators which could cut emission concentrations by at least 50 per cent.

The other type of environmental disturbance caused by the power plant is due to the use of river water for cooling and condensing the spent steam from the tail end of the turbines. The cooling water is heated by as much as 11°C in the process, and then dumped back into the river (see diagram 1).

In the winter, this warm exhaust water and the water vapor in the plant's exhaust gases can lead to the formation of clouds of ice fog. Depending on local wind and weather conditions in the river valley, such clouds near the High Level Bridge may reduce visibility for motorists in the immediate vicinity and create a traffic safety hazard. This has fortunately not been a serious problem to date.

The warm water discharging into the river has other effects. It's important for river water to have oxygen dissolved in it, to support its plant and animal life. And the warmer the water, the less oxygen it's able to contain. But on the other hand, the exhaust water provides an ice-free area downstream from the plant in winter. So oxygen is able to enter the water from the air--and this probably more than compensates for the fact that warmer water has less potential to hold dissolved oxygen.

Thus even though it burns a clean fuel and produces a "clean" product (electricity), the Rossdale power plant does have some effects on both air and water quality in Edmonton.

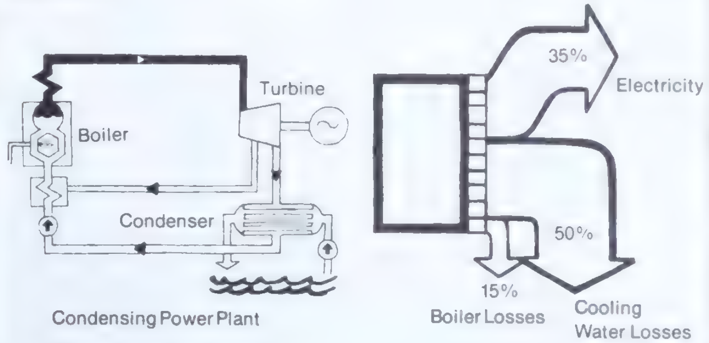
There are other problems with power stations in cities. They typically take up a large chunk of valuable and limited real estate, a special problem when the station is located near the centre of the city. In the case of Rossdale, the site occupies some three hectares of city-owned land which could possibly serve the public in a variety of other ways besides generating electricity, for example as parkland or a recreation complex.

Most thermal power plants need large areas for fuel delivery and storage, but Rossdale is fortunate to rely on natural gas. Although this is an expensive and premium quality fuel, its convenience and relatively pollution-free properties for an urban power plant has so far made it worthwhile for Edmonton Power.

The fuel bills for a plant the size of Rossdale are mounting rapidly, however. Gas consumption figures released by Edmonton Power and compared with average household consumption figures supplied by Northwestern Utilities show that, in 1978, the plant consumed enough gas to meet the annual needs for domestic hot water and space heating of more than 65 per cent of Edmonton's single detached homes.

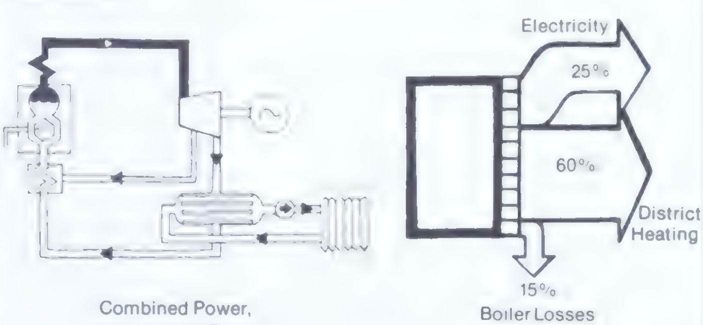
Of the total energy input to the plant in the form of natural gas, slightly more than 30 per cent is transformed to electrical energy for distribution on Edmonton Power's

DIAGRAM 1



Condensing Power Plant
Current Rossdale Operation

DIAGRAM 2



Combined Power, and Heating Plant

grid. Ten to 15 per cent is lost in the heat of exhaust gases, and more than half is lost to the cooling water. In other words, of the plant's total annual natural gas consumption, over 65 per cent goes to heating the North Saskatchewan River and Edmonton's air.

At the same time, homeowners and building managers throughout central Edmonton are also using natural gas to heat their buildings, and paying bigger bills every year to do it.

The City of Edmonton is now studying the feasibility of improving energy efficiency at the Rossdale plant by channelling its waste heat into district heating for the city's downtown core. Such a system would work this way:

Steam coming from the turbines in the generating station must be condensed before going back to the boilers. But instead of using cool river water for the condenser phase, water could be recirculated in underground pipes throughout the city and used to heat individual buildings (see diagram 2).

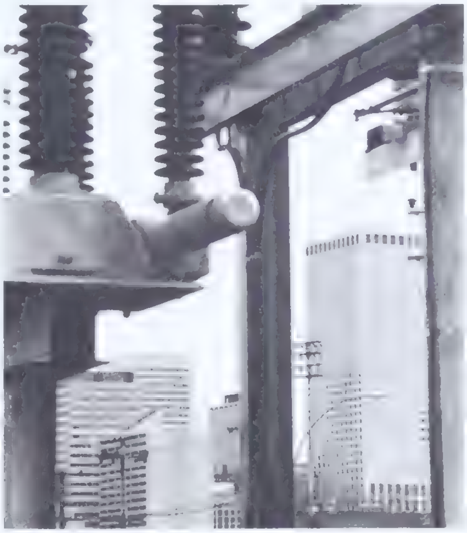
Hot but cooling water from the condenser at the Rossdale plant could be pumped through insulated pipes to buildings in central Edmonton. In each building, the hot water from the distribution system would be fed through a high-efficiency heat exchanger and used to heat domestic hot water and water for internal space heating.

Hot water from the plant could be used for air conditioning too. It seems peculiar to think of using very hot water to cool a building but in fact absorption chiller air conditioning systems are driven by the energy in hot water. These, of course, could also be fed by a district heating system instead of burning their own fuel.

After going through the heat exchanger in a building, cool water would leave the building and return to the plant in a separate return water pipe to be reheated in the condenser and re-circulated through the system. Instead of dumping waste heat from the plant into the environment, where it is of no use (and can lead to undesirable side effects), the heat is distributed and used to replace natural gas needed to provide water and space heating in buildings.

The efficiency of transformation of natural gas at the Rossdale plant to useful energy could thus increase from its current level of about 30 per cent to 80 per cent.

As the amount of heat needed for district heating increased, the electrical output of the station would be cut somewhat, but the overall efficiency of energy transformation would remain very high.


LAUREN DALE

The expense of the distribution system and a portion of the plant's fuel costs would be paid through the sale of the heat distributed.

This type of district heating scheme offers the potential of very large energy savings as a result of increased efficiency of energy use and the reduced need of individual buildings for heating fuels. It has been used for several decades with great success in northern European countries such as Sweden, Finland and Germany.

The city's study, which is still underway, will examine the nature of heating and cooling loads of buildings within the proposed area of service, and use these to consider the type of equipment and distribution system needed to capture, store and transmit the heat produced at the plant.

District heating could provide Edmonton Power with a means of making the operation of the Rossdale plant more energy efficient. (As a side-effect it would also cut the total levels of atmospheric pollutants by eliminating the need for individual buildings served by district heat to burn their own heating fuel. Thermal pollution would be cut down by reducing the Rossdale plant's use of river water for cooling, and by reducing the inefficient combustion of fuel in small independent furnaces or boiler plants.)

There are difficulties with district heating, though. Some flexibility must be preserved because the peak demand periods for electricity and heat, which are produced simultaneously at the plant, may not coincide exactly. In Edmonton, the peak heating season corresponds generally with the period of peak electricity demand, but daily or weekly loads fluctuate.

By keeping some of the plant's generator units simply for electrical production and not combined power/heat production, flexibility would be preserved. In addition, hot water storage in tanks could be provided at the power plant, to cover periods of high heat demand when electricity production declines.

Alberta depends on its fossil fuel resources to drive the provincial economy. As these become more expensive due to the increasing costs of discovering and extracting the resources, their mounting environmental costs, and the increasing scarcity of fossil fuels in a situation of continuing high world demand, it will become imperative that we use our own non-renewable energy resources as efficiently as possible.

Conversion of the Rossdale power plant to combined district heating and electrical co-generation is an excellent example of the type of energy-conserving approach needed. It offers an energy-efficient way to meet much of Edmonton's needs for heat and electricity while improving environmental quality.

Stephen Tyler is a graduate student of urbanism at the University of Calgary's faculty of environmental design. He has studied district heating systems in Stockholm, Sweden.

Sharon Adams

Domestic energy consumers are counting the costs of being...

Hooked on Convenience

...and see here. You press this button, the fridge door opens and the eggs jump out of their shells.

With the advent of Leduc No. 1 in 1947, Albertans were introduced to an energy-rich era, and have since become slowly convinced the province has an inexhaustible supply of energy. This conviction is reflected in our high-energy lifestyle, a lifestyle barely imagined here two decades ago, and unimaginable in underdeveloped countries which may never have abundant and easily obtainable energy.

Our excesses surround us: the cars that are traded in biannually for newer models; appliances that eat up electricity; over-packaged "convenience" food; at least one of three daily meals eaten outside the home; televisions, radios and stereos which daily play to no audience in an empty house; lights left burning needlessly; over-use of the auto.

This is quite a different society from the one into which I was born 30 years ago. For the first six years of my life the family lived in a remote mountain town without benefit of electrical, water or sewage service.

We had to provide all our own water, all the heating and cooking fuel. We used both carefully, for unwise use meant extra work.

It was considered quite an art to be able to keep the big wood and coal stove occupying one of the house's two rooms going all night on one stick of firewood. The women planned the cooking chores so the stove need not be stoked often. In the morning, the house was heated and breakfast cooked on the first big blaze of the day. In the afternoon, the fire was stoked up for baking and preparation of the big evening meal. In between, except on the coldest days, the firebox was fed only enough wood or coal to keep the fire from going out.

Distance from larger centres made us unconscious conservers in other ways: we bought flour and sugar in 45-kilogram (then 100- pound) bags; used a root cellar for storing vegetables and meats; read and worked by natural light for as long as possible, for coal oil for lamps was expensive.

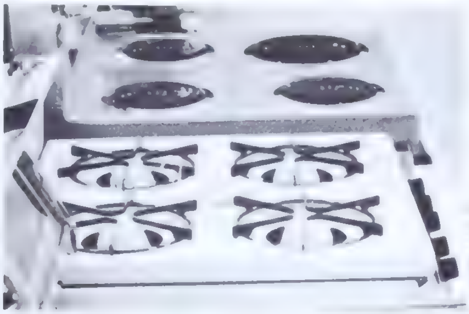
Today's homes are run quite differently. Appliances, energy-*users* all, proliferate. We are uncomfortable if the house isn't at a steady 21 degrees Celcius; we use hot water and electricity with little regard for the energy cost involved; our garbage bags overflow with wasted and needless castoffs from the weekly grocery cart.

W.J. Young, senior vice-president and director of Imperial Oil Limited, recently explained to an audience of automotive engineers how the change was effected: "Twenty years ago, it was a society of rapid growth and rocketing consumption. Both population and real incomes were increasing quickly, supporting new production processes that took full advantage of the economies of scale...Technological breakthroughs were creating new products--in fact, whole new industries. Underpinning the whole structure--to an extent that we didn't appreciate at the time--was a seemingly unlimited supply of energy, at prices that actually decreased in real terms throughout much of the post-war period. As a result, it was a time of substantial and continuing gains in productivity, with a very low rate of inflation. Our standard of living rose and seemed to have no limits.

"It's more than just nostalgia that makes the '50s and '60s seem almost like a different century. However, I think we also recognize that the conditions of the '80s are what we're going to have to grapple with in our business, professional and personal lives."

The federal department of energy, mines and resources, in its booklet *100 ways to save energy and money in the home*, says that "as private citizens we consume almost 20 per cent of Canada's energy budget in our homes, and over half the transportation energy in our cars, giving us a total direct consumption of about one-third of the total."

And "the other two-thirds of Canada's consumption is used to produce the goods and services that we as consumers demand. This means that our potential for conservation is not limited to that one-third of the total energy budget that we consume directly. By careful purchases, consumer action,



LAUREN DALE

LAUREN DALE

recycling and choosing energy-efficient travel modes we can have an impact on the other two-thirds."

The booklet says if consumers cut their energy consumption by 10 per cent by such means as furnace tuning, insulation, lower temperatures and other measures, the nation as a whole would cut back consumption by two per cent--"a tremendous energy and dollar saving."

Alberta's energy consumption figures bear out the national statistics. Ian Burn, energy conservation manager with the department of energy and natural resources resource information services, notes that in 1977, residential consumption accounted for 20 per cent of the province's gas (excluding that use for electricity generation) and 20 per cent of the electricity.

His office, aiming to make the average houseowner more concerned about energy conservation, has just produced a booklet, due for province-wide circulation in the fall, called *Energy Matters*.

The booklet looks at energy use--and waste--from a home's basement to its attic, and suggests money- and energy-saving modifications. The family car also comes under scrutiny.

The City of Calgary electric system, along with the province's other electric utilities, is out to persuade electric consumers that wise use of energy will mean resources can be stretched a bit further. In its brochure, *A guide to operating costs of electric appliances*, it says: "There is no energy crisis in Alberta, and thanks to a plentiful supply of fuels used to generate power in our province, there is no prospect for one in the immediate future. *Carefully managed*, Alberta's resources are sufficient to supply our electrical requirements for years to come."

But the brochure goes on to say that 85 per cent of Alberta's electricity is produced from the burning of fossil fuels, not from hydro, so "every time we switch on a light or an appliance we are using resources that are non-renewable and ever-diminishing."

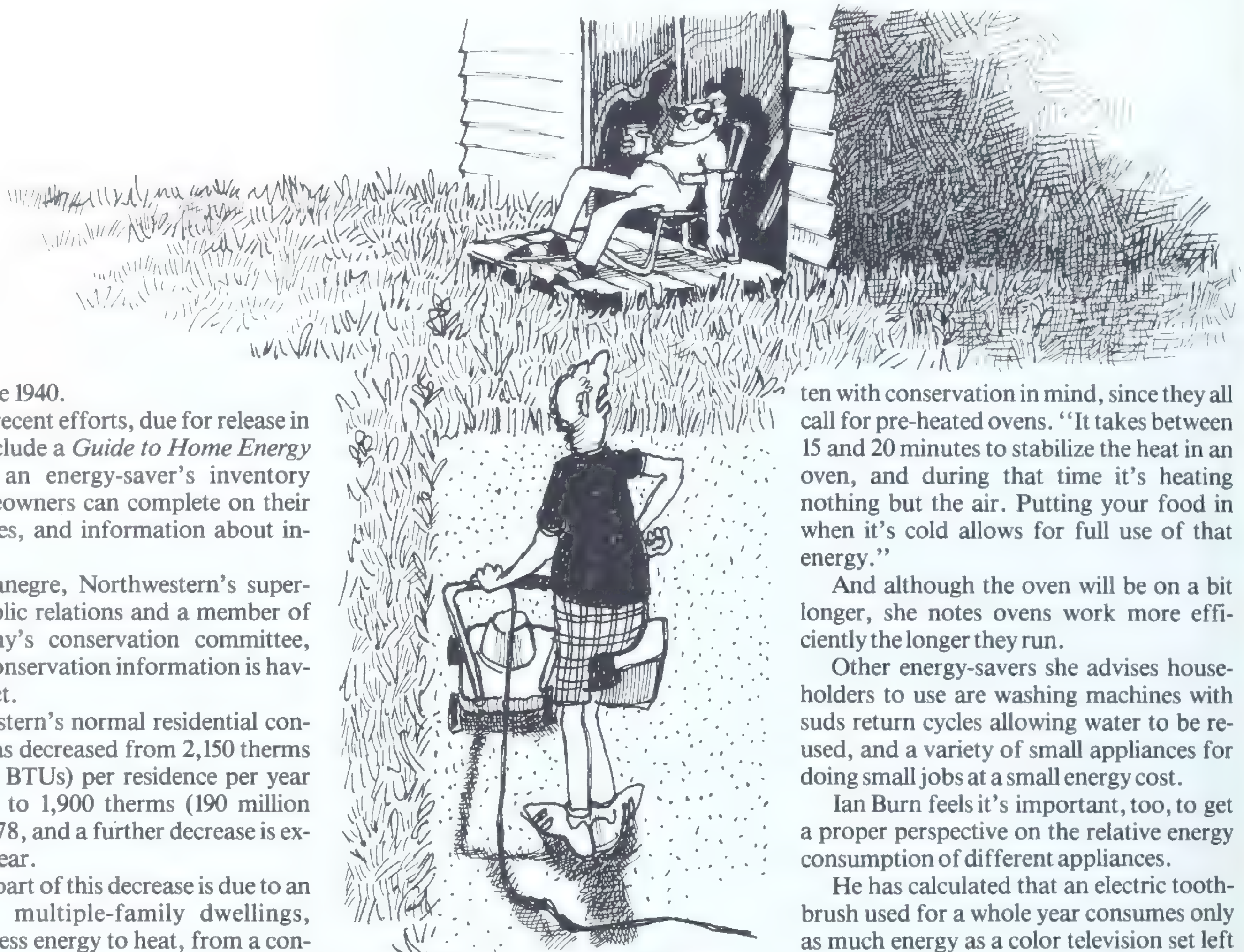
Marilyn Kaiser, customer relations manager for the city's electric system energy program, says there's "no way to sell hard-sell conservation in Alberta."

"The message we want to get across is to be wise about energy use, to conserve without substantially altering lifestyles."

To that end, the Alberta electric utilities have jointly undertaken a conservation campaign in which domestic electricity users are urged to use cooking appliances to capacity (fill the oven instead of using it to bake one potato, use the electric fry pan with a thermostat control rather than a stove burner, buy a microwave oven), save operation of heavy appliances until after peak load hours of between 5 and 7 p.m., use timers to control block heaters and lighting.

By following the companies' advice, says Kaiser, consumers "still only save pennies, but it's the habits we want to create."

Northwestern Utilities, which serves some 240,000 gas consumers in Edmonton and northern Alberta, has been telling its customers about the advantages of wise en-



Sure it'll save energy if I mow on right across your lawn... **YOUR ENERGY!**

ergy use since 1940.

Its most recent efforts, due for release in October, include a *Guide to Home Energy Efficiency*, an energy-saver's inventory which homeowners can complete on their own premises, and information about insulation.

Jerry Manegre, Northwestern's supervisor of public relations and a member of the company's conservation committee, notes that conservation information is having an impact.

Northwestern's normal residential consumption has decreased from 2,150 therms (215 million BTUs) per residence per year up to 1975, to 1,900 therms (190 million BTUs) in 1978, and a further decrease is expected this year.

Though part of this decrease is due to an increase in multiple-family dwellings, which take less energy to heat, from a conservationist point of view it's an encouraging trend.

The utilities are especially anxious to lower peak hour demand. In Calgary's case, the utility is billed on a combination of the amount of power used and the amount of reserve needed to meet peak hour demand. The lower the peak hour demand, the lower the cost of the energy, and the lower, eventually, the consumer's bill.

Evelyn Erdman, director of Calgary's Canadian Western Natural Gas Company's Blue Flame Kitchen, learned energy efficiency as a child, when her home had its own electric generator. Even as a child, she was made to understand that if the battery storage ran down from overuse of electricity, there would be no power. To this day she finds unused lighting irksome.

Unfortunately, she says, not all Albertans are prepared to make the commitment to energy conservation, mainly because the problem is not perceived.

"There are so many conflicting reports on the energy supply, and people are not conscious they've got to save."

Erdman suggests homeowners think about the chores in their homes, then tailor appliances to fit the need. A combination household using many different energy sources would be ideal, with solar heating, gas-fired hot water heater, furnace and range, electric lights and appliances, microwave ovens and convenience appliances all meeting certain demands at the lowest energy cost.

Electric frypans are more efficient than burners, whose energy is largely dissipated into heat in the room. Gas dryers are more efficient than electric dryers, since they draw in fresh air and heat more quickly. Alberta's large gas supplies make gas-fired furnaces, ranges and water heaters more energy-efficient than electrically-powered models.

There are other Erdman tips for the cook: use the oven to its full potential, filling it up with a whole meal or several meals (some to be frozen for later eating) each time it's used; use a pressure cooker and vegetable steamers; don't pre-heat the oven for uses other than baking.

She warns that cookbooks are not written with conservation in mind, since they all call for pre-heated ovens. "It takes between 15 and 20 minutes to stabilize the heat in an oven, and during that time it's heating nothing but the air. Putting your food in when it's cold allows for full use of that energy."

And although the oven will be on a bit longer, she notes ovens work more efficiently the longer they run.

Other energy-savers she advises householders to use are washing machines with suds return cycles allowing water to be reused, and a variety of small appliances for doing small jobs at a small energy cost.

Ian Burn feels it's important, too, to get a proper perspective on the relative energy consumption of different appliances.

He has calculated that an electric toothbrush used for a whole year consumes only as much energy as a color television set left on and unwatched for an hour. That same amount of wasted energy is what's needed for an electric carving knife to slice up 36 4.5 kilogram roasts.

Lois McIntosh, president and owner of Calgary's Microven Consultants, says a microwave oven can be a big saving in the kitchen.

The savings come about because microwave cooking immediately starts heating the food, not the container and the surrounding air. And it takes only a quarter of the time, resulting in a saving in electricity.

"There can be enormous savings aside from electrical consumption. You use fewer dishes, which means less dishwashing and a savings in hot water heating. Food is recycled more easily, and unappetizing, dried-up food, like the butt end of a roast, can be regenerated. And with so many families with both partners working, the time saving means fewer meals out."

Like most North Americans, Albertans are hooked on convenience, and some of the biggest sellers these days are convenience foods. Mrs. McIntosh points out convenience foods are often prepared more efficiently than if each householder prepared each dish individually, wasting heat energy.

LAUREN DALE

Many products, from onion soup to precooked dinners, are prepared commercially with use of microwave ovens, and the economics of scale operate to make production energy use cheap.

But packaging is another matter. Convenience foods are almost universally overpackaged, a great concern to Edmonton's STOP (Save Tomorrow Oppose Pollution) group.

Jeff Winkelaar, STOP's secretary and a collaborator on the organization's *The Conservation Cookbook*, identifies excess packaging as a major environmental concern.

"Packaging accounts for between 30 and 50 per cent of the municipal waste load. *The Garbage Book* says that $2.3 billion is spent annually on materials, machines and services to package goods worth $55 billion, and by 1977, 90 per cent of that packaging became garbage. That's $100 for every person in Canada--and excluding the disposal cost."

He quotes U.S. statistics showing that 40 per cent of all paper production goes into product packaging, as does 14 per cent of all aluminium production and 75 per cent of all the glass production. All that packaging accounts for between 12 and 40 per cent of the price of the product and is heavy on energy.

But aside from the pocketbook cost, Winkelaar says his organization is concerned that packaging comes mostly from diminishing resources. And goes directly into the garbage.

Most packaging, he says, is there simply to add to the image of the product, to improve its marketability.

"It's turned into a profitable industry, and that's why we're seeing so much packaging," he says, adding that Proctor and Gamble, one of the largest food processors in the country, spent $16 million in advertising last year, second only to the federal government. Part of that advertising cost was excessive packaging.

He says action consumers can take to reverse the process is to avoid buying overpackaged food, send the packaging back to the manufacturer so he can't fail to see the point, and lobby with the provincial government to change some laws which would help reduce packaging.

One useful measure would be a change in the Beverage Container Act to standardize soft drink containers. Standardization would mean more of the glass would be recycled, and recycled glass is the most energy-efficient container.

"We emphasize avoiding excess packaging in the first place, thereby reducing the need for recycling. It's much better to simply buy in bulk and cook your own food," Winkelaar says.

He adds that eating out seems to be more energy-efficient than purchasing overpackaged convenience foods, since economy of scale would seem to operate in food preparation, too. But it is very difficult to judge what the real energy expenditure of out-of-home dining can be.

"When you have a grill and it's being used a lot, it's more efficient, But energy goes into processing the foods we eat when dining out. And then there's the packaging. McDonald's uses really excessive packaging compared to other burger chains. Everything comes in those plastic containers. Plastic is made from a diminishing resource. And where do you start counting the energy cost? You have to consider the cost of using the car to get to the place where you're going to eat."

In addition, businesses which use linen, cutlery and china expend energy in cleaning.

It seems that economizing on energy is going to call for a change in lifestyle, a change which will have to go farther than turning down the thermostat and installing insulation. We will have to start considering the total energy cost of even the most basic essentials--providing ourselves with food, housing and clothing.

Sharon Adams is a journalist in Calgary.

Gillian Sniatynski

Guarding the Giant's Share

Conservation is catching on among industrial and commercial energy users.

LAURENDALE

If energy conservation efforts are to have any effect, the big users--in industry and commerce--must do their share.

In 1977, industrial consumers took 35 per cent, and commercial users 33 per cent, of Alberta's electricity supply. Industry took 66 per cent of 1977's oil (including the amount used as feedstock in manufacturing processes).

Of the province's 1977 gas supply, industrial users took 53 per cent, and 21 per cent went to commerce.

It's apparent that industrial and commercial consumers take the giant's share of Alberta's energy supply. Are they using it wisely?

Fortunately, in many cases they are. And as is the case with many homeowners too, sheer economics are at the root of their efforts. For the really big users now, energy just costs too much to squander.

Many companies in the province have established energy management committees, and/or created positions carrying titles like "energy manager". In the past few years, their efforts have netted some big energy--and dollar--savings.

Imperial Oil's Strathcona refinery on the outskirts of Edmonton certainly ranks as a big energy consumer, as well as producer. Its daily consumption is the equivalent of 1,272 cubic metres of fuel oil. Energy co-ordinator Bert Donkers estimates its annual consumption is enough to heat 90,000 Edmonton homes for a year.

The bill for that sort of consumption is a staggering $30 million. But Donkers says that, based on 1975 consumption and operation levels, the refinery has managed a 40 per cent energy savings.

How has it been done? For the most part, by saving waste heat.

The refinery brings in raw crude oil, and processes it into several different components which are later combined to form the various grades and types of fuel needed by consumers.

Most of the energy is used in the 10 process furnaces, which heat the crude oil and intermediary products to between 315 and 365°C. before they go to special towers for separation and distillation.

So at any one time in the refining process, there is hot oil on its way to being cooled, and cool oil on its way to being heated. The refinery installed heat exchangers to make the process more energy-efficient. Greatly simplified, these work by allowing the heat from the hot-but-cooling oil to pass to the oil on its way to being heated in the furnaces. The warmer that oil is on arrival, the less work the furnaces have to do.

Many refinery products have to be heated in storage. And any tank which has to be heated is insulated. Donkers notes that it costs $400,000 to insulate a tank whose capacity is 47,700 cubic metres--but that tank could also cost some $90,000 a year to heat.

Other energy savings have been made possible by computerizing combustion control on the furnaces. This system regulates the amount of excess oxygen in the furnace, thus preventing it from heating up unnecessarily.

A computerized remote-control monitoring system (right) checks on lighting and heat in several University of Alberta buildings.

LAUREN DALE

Altogether more than $15 million has been spent on energy conservation devices at the refinery since 1975.

But not all the credit goes to sophisticated equipment.

"The initial stage is a good maintenance and operation program," says Donkers.

"It's getting steam leaks fixed and keeping insulation on all the lines. It's keeping equipment running as efficiently as possible.

"It's the same as your car--if it isn't tuned right, you go out and tune it."

The Steel Company of Canada (Stelco) is another giant in the energy consumption field. In 1974 its four western region plants--two in Edmonton, one in Camrose, one in Regina--were using 5.3 million BTUs of energy for every ton (or .9 tonne) of steel they produced.

In 1978, that amount was down by well over 15 per cent. Given that the 1978 western region production was 270,000 tonnes of steel, that's a substantial saving.

In the steel-making process, the bulk of the energy goes into electricity for arc furnaces and gas for reheat and ball mill furnaces.

Two arc furnaces sometimes have to operate simultaneously; they are tapped into ladles which are transferred to a continuous casting machine. Stelco found it possible to change the sequence of operation of the two furnaces so that, for part of the time, only one furnace was going.

The efficiency of the gas furnaces was tested by frequent combustion checks. Furnace idling during non-operating hours was cut back. Motors and conveyors were shut down during lengthy delay periods.

John Marshall, energy management committee co-ordinator for Stelco's western region, says these measures are part of a continuous process.

"What we are talking about is planning on-going procedures that through the support and direction of top management are giving results," he said.

The University of Alberta has an on-campus daytime population similar to that of downtown Edmonton, in some 630,000 square metres of academic buildings.

With utilities bills in the region of $3 million annually, it was decided in 1976 to set up an office of energy management to see what sort of savings could be achieved by energy conservation measures.

The office set to work in October, with Ron Burns its director. The mandate was to run energy audits, recommend on proposed modifications that would result in savings, undertake to have the modifications carried out, and then to monitor and report on them. There was also an important public relations function; the office was to highlight examples of waste in energy consumption and generally promote the idea of energy conservation on campus.

Because of the variety of types of energy consumed, Burns says it's hard to put a figure on the amount saved in BTU or oil-barrel-equivalent terms. But the financial savings are plain to see. As of March, 1979, he estimates the university has managed to save a total of $1,385,000 in utilities.

The projects which have made these savings possible range from simple housekeeping measures to some complex technical redesign.

Burns says one of the most visible efforts and one which has been running since 1976, was the "delamping" project.

All 260,000 fluorescent lights in the campus buildings were examined on a room-by-room basis, and those considered non-essential were removed. This eliminated some 73,000 tubes, and saved about 11.3 million kilowatt hours a year (to say nothing of some $220,000). Given that the average Edmonton house uses, according to Burns, about 12,000 kilowatts of power a year, and the savings could power some 1,000 homes annually.

Another "housekeeping" measure involved car park plug-ins.

These were scheduled so that power came on when temperatures hit -10°C, and stayed on every alternate half-hour.

Burns admits this project was sometimes

Line carrying methane gas from Consolidated Concrete's landfill site

less than popular; though many tests were run to ensure that criteria chosen would allow a comfortable start for most cars, there was still the occasional complaint. In such cases, cars were started courtesy the office of energy management!

More complex projects involved rebuilding air handling systems in some buildings, so that heating was not automatically adjusted to the temperature of the coldest spot; turning hot water systems off in "off" hours; installing computer controls in the heating plant to improve boiler combustion.

Other programs are on-going. Energy audits are being run on each campus building, which will ultimately lead to recommendations for economically justifiable modifications, and, in time, some design changes.

At the back of all the planning, says Burns, was the recognition that savings of the magnitude the university wanted couldn't be made without a major commitment to automation and remote control.

About five campus buildings are now part of a computerized remote control monitoring system. Lighting and heat in these buildings can now be controlled by terminals in the control centre in the general services building. It's hoped that within five years every campus building will be linked to the system.

In the interests of energy conservation, Algas Resources, a subsidiary of Alberta Gas Trunk Lines (AGTL), is branching out in a new direction--greenhouses.

It began with a commitment to conservation, and the knowledge that a tremendous amount of heat was being lost from pipeline compressor stations.

It was found that at the Princess compressor station, AGTL's largest, some 240 kilometres east of Calgary, about 10 million BTUs per hour could be recovered from the two continuously running engines.

In October, 1977, work began on construction of a greenhouse near the station. A waste heat recovery boiler was set up, and a mixture of water and glycol, a form of alcohol, was chosen as the medium to carry the heat from the boiler to the greenhouse. The mixture enters the boiler at 82°C. When it is heated to 93°C it is piped through the compressor station buildings, through three workers' homes, and on to the greenhouse 200 metres away from the station.

Last year, the first year of the greenhouse's operation, a crop of tomatoes and cucumbers was grown, though not for commercial purposes. But project manager Stephanie Ho Len says the plan is that the greenhouse will become commercially viable in the future.

An Edmonton landfill site may soon sprout a greenhouse or two of its own, if Consolidated Concrete Ltd. follows through on some preliminary planning.

The landfill site once belonged to Consolidated's sister company, Inland Cement. Originally used for clay excavation, it became, says Consolidated vice-president Ben Amos, a "hole in the ground."

Consolidated took on a contract with the City of Edmonton to fill the hole with garbage--and an enterprising energy project was born.

Garbage buried in a landfill generates methane gas. And unless that gas is properly controlled, it can create severe problems for any subsequent buildings on or near the site.

Gas management is also a concern of the earth sciences division and the waste management division of Alberta Environment.

So some four years ago, the department, with Consolidated's co-operation, drilled some wells in the landfill site to see what it contained.

Charlie Moell, a former earth sciences division geologist now working with the waste management division, says those early wells gave some surprising results; in some cases, what came up was 95 per cent methane--a very high quality gas.

The quality of the gas relates to what's been buried in the landfill. The high methane yields were largely due to the effects of kiln dust buried in the site before it actually became a landfill.

All the same, promising gas yields seemed likely. So a project, jointly funded by Alberta Environment and Consolidated Concrete, was mounted.

Four cells were designated in the site, each containing about 3,600 tonnes of garbage. In two of the cells, garbage was shredded--a procedure later found to increase greatly the rate of gas generation. Wells were drilled and the cells were carefully monitored to test level and rate of gas generation.

Then it was decided to try pumping the gas, to see how much could be tapped and what sort of energy value it contained.

Pumping began in December, 1978, from six hectares of landfill site. It's been going on continuously ever since, at the rate (from 11 wells) of about three to 4.5 cubic metres a minute.

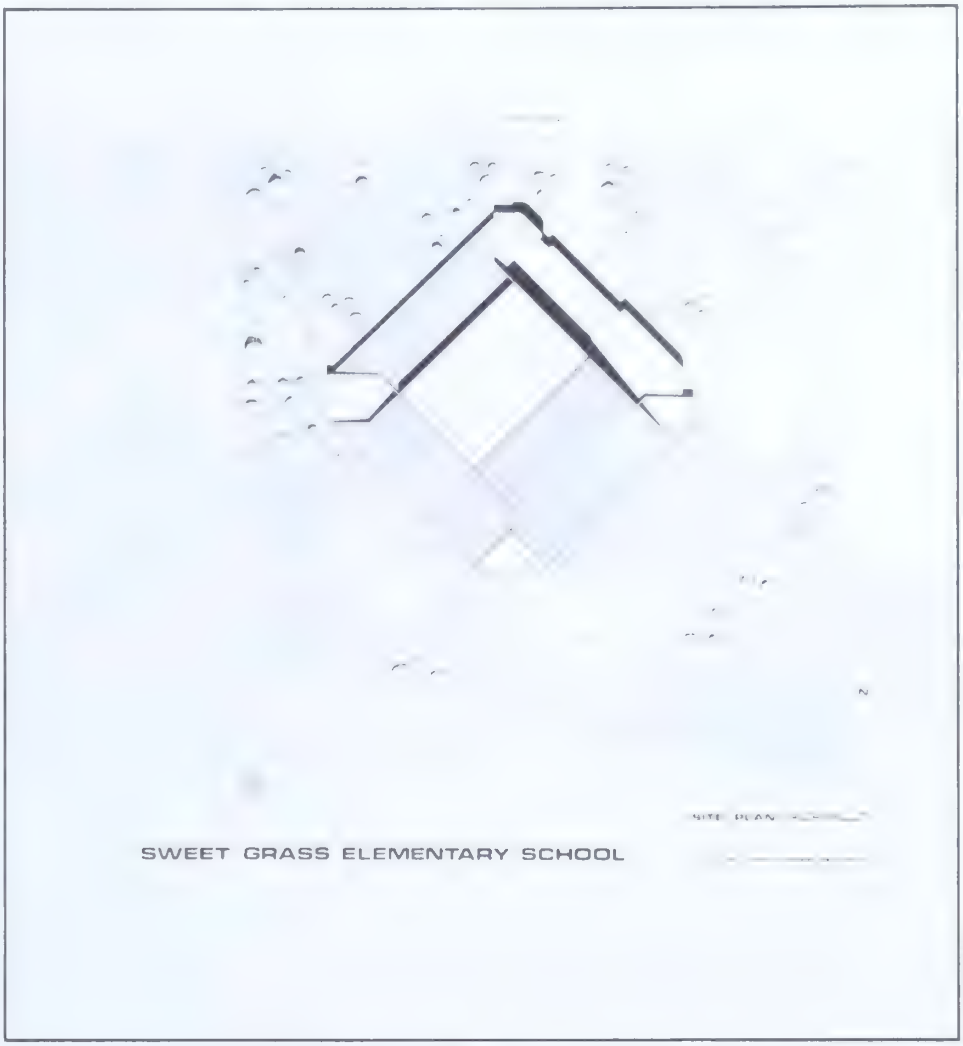
The gas from the pumping system is about 20 to 30 per cent methane--not a particularly high quality gas, says Moell, but one well suited to many industrial uses.

Now it's up to Consolidated Concrete to decide what will happen to the gas. Amos says greenhouses heated from the gas are being considered as a new venture for the company.

Jack Spearman

Practising What They Teach

Some Alberta schools join energy conservation efforts.



SWEET GRASS ELEMENTARY SCHOOL

LAUREN DALE

Alberta students have been taught for years now about conserving energy in the home.

Teachers have told them time and again about turning off lights in an empty room, about making sure furnaces are adjusted for top efficiency and storm doors are weather-tight.

The problem is that in thousands of classrooms lit by dozens of fluorescent lights that can't be turned off room-by-room, just down the hall from entrance doors which don't have vestibules and not far from rooms containing inefficient boilers, teachers can't practise what they preach.

On wintry mornings, classes are toasty-warm because furnaces weren't notched back when the caretaker went home the night before. Throughout the building exhaust fans hum as usual because they weren't turned off at the end of the day.

There's another side as well. The Calgary board of education, for example, pays about $4.5 million a year to heat and light its 190 schools--a hefty investment from taxpayers.

But a project by the department of education is trying to come to grips with rising costs of heating and lighting Alberta schools.

During the past two years, the department has made three studies in public schools in Calgary, Edmonton and Grande Prairie. The results will be examined closely and will likely find their way into energy-conservation policies around the province.

"We realized there are an awful lot of schools built in this province in a time when energy just was not a concern...schools are real energy users," said Warren Hathaway of the department's planning and research branch.

So in Calgary, ways of modifying schools to eliminate waste are being examined.

In Edmonton, architects have designed a school which tosses out usual floorplans.

And in Grande Prairie, researchers tried to see what could be done without spending money, a project which included modifying behavior and attitudes about energy.

Here, in a nutshell, are details of the project in each city:

In **Calgary**, boilers cost the public school board plenty.

"They are the greatest single area of waste in a school," says mechanical engineer Niel Patterson. "Boilers usually are not even 50 per cent efficient so any savings in that area are bound to be worthwhile."

So a $30,000 provincial grant has been applied to two Calgary elementary schools, much of it spent on boilers which, while out of sight for just about everybody except the caretaker, are not out of mind when the gas bill comes due.

In the past, schools were given boilers powerful enough to stand up to the coldest day of the year. It was like putting a V-8 engine in every automobile regardless of how often a driver has to step on the gas.

Several modifications have been made on boilers considered too large and inefficient. Boilers often have five gas heads inside and one of the first alterations was to stage firing of the heads so if only one is needed, only one is on.

Patterson said other proposals include installing six small boilers instead of one big one so any number can run as weather dictates. Air injectors to make combustion more efficient have been added, and with a similar intent, exhaust fans which used to blow heated air outside have been hooked up to boilers to give the flames more air.

All in all, about 20 modifications have been made from which a "shopping list" of energy-savers for schools around the province will be drawn up once calculations from the Calgary project are complete.

The other major energy-saving effort is in revamping ventilation systems and limiting the amount of fresh air drawn into a school. Patterson explained that the less fresh air brought into a school, the less there is to be heated on winter days.

"In the past, we'd draw in 30 to 40 per cent fresh air and it's just not necessary." Now the limit--the building codes minimum--is 15 per cent.

In other modifications, technicians have measured the quality and intensity of lights and removed unnecessary bulbs. Two-speed motors have been attached to main exhaust fans so they run low when the school is unoccupied; gadgets attached to thermostats automatically lower the heat at

Architect's drawings of Edmonton's new Sweet Grass Elementary School.

LAUREN DALE

night and on weekends.

Although there are no details yet on how much money these methods might save the school board, Patterson said savings will be "significant."

"In the boilers, we're looking for at least a 10-per-cent saving and that's on the conservative side. Personally, I think it will be something better," he said.

Better management but at no cost was the focal point of the **Grande Prairie** leg of the project.

"For example, some schools have the lights on year-round when there aren't students in them all year," said project co-ordinator Jim Love of the University of Calgary's faculty of environmental design.

The first step two years ago was to measure energy consumption and then develop wide-ranging plans for conservation.

"There's a tendency to throw up a school and then forget about the utilities...I remember one principal who was trying to get his school to cut down on pencils and paper. But when he found out 10 times that amount was going into energy, well, he just wasn't aware," said Love.

The project tried simple approaches on both machinery and people. Caretakers were urged to check heat and exhaust systems for clogged ducts which made fans work harder. Newsletters were published with charts of the previous year's energy consumption, to try to get teachers and caretakers to reduce energy use.

"In a sense, we wanted to find out how far you could go with this kind of approach...behavior modification was a part of it," said Love.

The project was applied differently in each participating school. While in some buildings, ventilation systems were fixed, in others, they could be adjusted. In newer schools with ceilings full of fluorescent lights, tubes were removed.

Love is working on an interim report to go to the department of education this summer. He says simply watching energy consumption, and minor tinkering with mechanical systems, can add up.

"It varies from school to school, but I'd say a reduction of 10 per cent is within the reach of every school. In more wasteful schools, it could go up to 40 per cent."

In southwest **Edmonton** this summer workmen will be finishing construction of a school which looks like a cross between a square and a pyramid, an unorthodox design engineers think will cut fuel bills by two-thirds.

The 300 students at Sweet Grass Elementary will find a few changes from the layout of former schools. The gymnasium, rather than standing with its tall walls open to the elements, will be at the centre of the building. Classrooms will surround and act as insulation for the gym, explained Tim Miner, director of design construction for the Edmonton public school board.

"The key to this school is the configuration and massing of the building on a north-south orientation to get optimum use of the sun," he said.

Sweet Grass, unlike schools built just a decade ago, will have huge windows, all with southerly exposures but with overhangs carefully calculated to reduce heat during warm months.

"We used all the energy-saving tricks we could think of in this one," he said, adding Sweet Grass is estimated to cost about $1.5 million for its 16 rooms, about the same cost as conventional schools of similar size also tendered in the last year. The province has granted $100,000 to the project--$60,000 for studies of the building and $40,000 towards construction, said Miner.

He notes it's not certain that all the energy-saving devices built into Sweet Grass are practical for other schools. Automatic systems to reduce ventilation, for instance, are "very expensive and we're not sure if we'll repeat them."

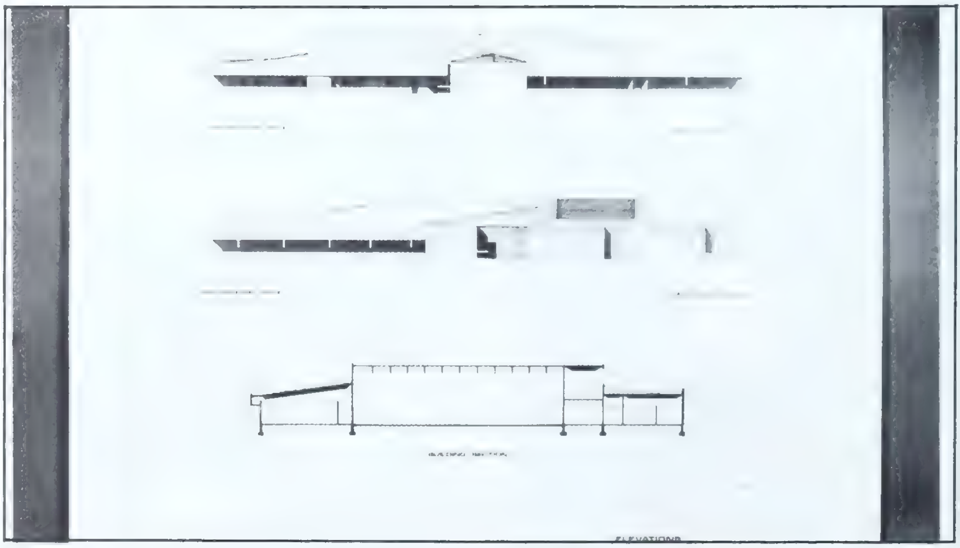
But the shape of the building, which reduces the surface area of exposed walls, is fundamental to the projected energy savings. And it's a design costing no more than conventional ones, he added.

If Sweet Grass fulfils expectations, heating bills should drop by two-thirds and the bill for electricity is expected to fall from an average of 650 kilowatt/hours per square metre per year to about 220.

The department of education will get a full breakdown of energy costs at the school two years from now. But Miner is optimistic the savings will be there.

"The board and everybody associated with this project is excited about it," he said.

Jack Spearman is a journalist in Calgary.



LAUREN DALE

Donald McMann

The Rules for Reclamation

The coal industry thinks they're tough.

ALBERTA GOVERNMENT PHOTO

There was a time when abandoned coal mines resembled the targets of enemy bombing raids. As time passed and more and more areas of land were rendered useless (not to say ugly) by the extraction of coal, the importance of reclaiming mined land was recognized. The fact that our society requires minerals which are found underground could no longer be seen as justification for the destruction of otherwise productive land.

Regulations governing land reclamation have grown steadily more stringent over the years. Now, resource companies are forbidden to disturb so much as one blade of grass or remove a single lump of coal without first winning approval for a plan to reclaim the land's previous productivity.

The history of the coal mining operation of Forestburg Collieries Ltd. at Forestburg, Alberta, shows how attitudes to land reclamation have evolved over the last three decades.

Mining has gone on in this area, approximately 135 south-east of Edmonton, since 1907. Forestburg Collieries, a subsidiary of Luscar Ltd., opened its Diplomat mine--the first surface mine in the area--in 1949. In 1956, arrangements were made for most of the mine's production to go to the Battle River generating station operated by Alberta Power Ltd. Today, the Diplomat Mine supplies half of the power station's requirements. Approximately one million tons (900,000 tonnes) of coal are produced every year.

When most people think of coal-mining, they picture black-faced men burrowing in underground tunnels. But because underground mining is slow, dangerous, and inefficient, Forestburg Collieries decided to mine its coal from the surface.

Surface mining, however, is not without its drawbacks. It is quicker, more efficient, and less hazardous, but at the same time causes great upheaval in the area. To get to the coal, all the overlying material is stripped off. This affects the land's productivity, destroys its natural drainage patterns, and drives away animal life.

The Forestburg example shows many of the problems involved in the reclamation process.

If you were to see a cutaway of the land at the Diplomat Mine, you would note four general layers. The top layer is approximately 30 centimetres deep and is composed of topsoil. Below this is a layer of till six to 10.5 metres in depth. Till is an aggregate consisting of clay, sand, and gravel,

ALBERTA GOVERNMENT PHOTO

which was mixed and laid down across nearly all of Alberta by the action of glaciers. Topsoil is formed by organic action upon till and so the two materials merge one into the other. Below the till is a layer of shale-like bedrock which is wedge-shaped, nearly two metres at its thickest. And underneath all of this is the coal. It is not hard to recognize the size and complexity of the extraction process. Topsoil, till, and rock--all referred to as "overburden"--are removed using a giant electric walking dragline equipped with an 8.5-cubic-metre bucket. Once the coal is exposed, it is extracted by a stripping shovel with a 23-cubic-metre bucket.

If depleted mines were not reclaimed, they would be desolate sites indeed. The topsoil, having been removed first, would have been buried under huge infertile mounds of till and rock. Besides the mounds would be the gaping excavations--equally barren--from which the coal had been taken. It was this prospect which prompted the creation and regular strengthening of Alberta's reclamation regulations.

Until 1967, a body known as the Reclamation Council required that the peaks of spoil piles, the mounds of overburden, be leveled and revegetated. This land was of little use except as marginal pasture land. In 1967 more was asked of mine operators: the mounds had to be further leveled in order to create a more gently rolling topography having better pasture conditions. During the next five years, almost 103 hectares were reclaimed to this standard. Then, in 1973, the Land Surface Conservation and Reclamation Act administered by Alberta Environment was passed, creating the toughest set of requirements yet. The key element in this new act is that a company is required as a primary objective "to ensure that the mined or disturbed land will be returned to a state which will support animal life or be otherwise productive or useful to man at least to the degree it was before it was disturbed."

In order to restore the land to equal or better condition, a reclamation plan must be established before the first sod is turned. And no two reclamation plans are the same, because mine sites--even those located close together--may differ widely.

What goes into a reclamation plan? Apart from an initial detailed inventory of surface features and productivity, information must be provided on surface and ground water, and a geotechnical evaluation of the site's capacity to carry overburden, tailings, discard piles and so on. Wildlife habitats, the amount of likely disturbance of vegetation, drainage patterns and soil characteristics must be examined, before reclamation strategies can be decided and fitted to a schedule.

This is a complex process which calls on the expertise of soil scientists, agrologists, biologists and many others. Respecting revegetation, a succession of growing seasons may be needed to provide all the data required to determine site productivity and again following soil reconstruction to evaluate the success of the reclamation plan.

Mine sites at Forestburg show the history of land reclamation standards in Alberta. Four sections have been reclaimed but not all to the current standards. One area, for example, was reclaimed to rolling pasture, which, while not suitable for farming, has made good grazing land for from 75 to 100 head of cattle. Here, erosion has been controlled and vegetation returned.

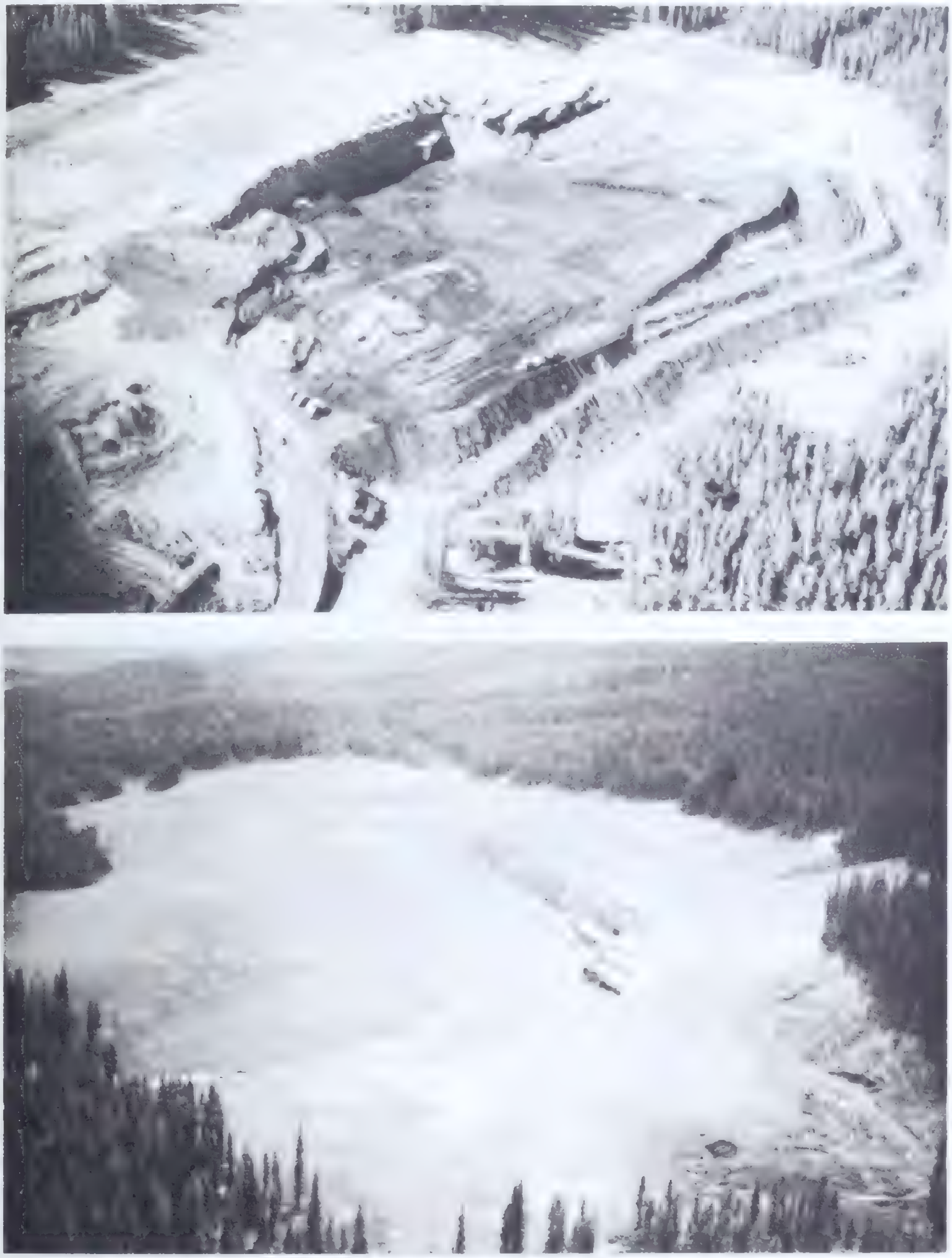
Reclamation up to current standards has also worked well in the region. In fact the drainage pattern on one section of land was notably improved. Before mining, the field had six stagnant sloughs. Now, with new contours, there is one central drainage area, and cultivation has been made much easier.

Revegetation is also progressing successfully. The ultimate objective is to restore cereal crop production, but newly reclaimed land is first put into hay. One reason for this is that the land needs a stabilizing period to settle it after mining. Another reason to delay the planting of cereal crops involves moisture. Depending on the time of year when topsoil is replaced, it could be deficient in moisture. The planting of a hay crop helps the land to catch a full season of rain as well as a winter's accumulation of snow.

The reclaimed land in Forestburg has yielded about 2 1/4 tonnes per acre (some 5 1/2 tonnes per hectare). This is consistent with hay yields in the district. Next year, consideration is being given to seeding wheat. This would be something of an experiment to see how quickly cereal crops can be returned.

The people at Luscar are proud of what they have been able to accomplish in land reclamation. Their successes to date seem to bear out what Garnet Page, president of the Coal Association of Canada, says when he states that "Canada is in the forefront of reclamation research and development." Page, who two years ago toured mine sites in Germany and England, found that this country's accomplishments easily stand up to comparison. The industry is "very responsible" and realizes that to stay in business, it "must keep nature in business."

But there are problems. When the provincial government passed its regulations and issued guidelines to the Coal Association, it included a special note explaining that reclamation plans would be flexible. Accordingly, a company would be required to submit an annual report in which it would outline its successes and then list any required changes to the original plan. The report would also set out expectations for the coming year.



Before and after: An abandoned strip mine in the Canmore area, purchased by Alberta Environment and reclaimed by its reclamation branch, under the Heritage Savings Trust Fund land reclamation program.

In practice things have worked differently. Despite the government's assurances of flexibility, many companies complain that their plans are being viewed as blueprints, any changes to which are made only after an extensive approval process. The government, they say, has even been known to raise objections if a piece of earth-moving equipment called for in the original plan is substituted for another.

Page explains that reclamation plans are created on the basis of geological information which only approximately describes the nature of deposits. The coal, after all, is under the ground, and it is "only when you come to mine it that you see the actual conditions." For this reason the industry feels that reclamation plans should be viewed as strategies to be altered where necessary, rather than as blueprints to be changed only after the presentation of elaborate justifications. Page goes on to say that the positions of the association and the government are essentially the same: they both believe in the value of pre-planning. The problem, as he sees it, does not lie with the act, but with its "rigid" interpretation by administrators who tend to "cling to the book." The association president wants to see a "closer working partnership" between industry and government, two groups he believes to be equally committed to reclamation.

Another feature of the act which Page would like to see more broadly interpreted is the "equal to or better than" standard. In his keynote address to the 1977 Coal Industry Reclamation Symposium held in Banff, Page expressed his concern:

> After mining, there are many alternative and productive uses for mined land. The decision as to which of these options is to be selected depends on the soil and weather conditions, the general terrain, the needs of the surrounding community, and the reclamation costs. A stringent requirement to put all mined land back to original contour and condition is not always desirable because of the more attractive options sometimes available.

The whole concept of reclaiming for alternative uses is one which has never been tried in Alberta. Mine sites, for example, could be redeveloped into first-class recreational land with ski slopes, cross-country trails, and toboggan runs. Different kinds of crops might also be tried. In one American project, reclaimed land was transformed into vineyards.

The law is vague and has semantic problems. How can you tell if one land use is equal to or better than another? Given today's high cost of beef, for example, is it less productive to take land which once grew hard-to-sell wheat and reclaim it for use as pasture?

While reclamation for alternate land use is being carried out in many other places, it is not being done in Alberta. Partly, says the industry, this is due to a lack of incentive from government and partly it is because the industry has no stomach for the massive amount of red tape such a proposal would generate.

Not only would alternative land use reclamation often result in more creative land use, it could possible lead to the saving of many millions of dollars. Land which once produced cereal crops could be economically restored to support pasture. After a number of years this pasture land would become more fertile as the underlying till evolved into more productive topsoil. However, to bring the land immediately back to its original productivity level--to reclaim it completely--might take millions of dollars more.

There can be a number of reasons for the extra expense. Topsoil may not be sufficiently plentiful or could perhaps be affected by toxicity from the bedrock. Extra soil might have to be provided or extended land management programs aimed at neutralizing toxins and increasing fertility might have to be undertaken. And all at great expense. The industry asks: "Is it socially responsible to spend that much money to avoid having a few sections of grain crop lands taken temporarily out of production?"

Short-term reductions in productivity could be considered as an allowable impact of coal mining--a fair exchange for a needed resource. It is argued that more flexibility is required in the administration of regulations when coal companies encounter difficult reclamations.

Nor does the government need to interfere in the reclamation process in order to guarantee that the job is satisfactorily done, say industry spokesmen. Every company wishing to develop a mine is required to put up security bonds which will only be returned as stages of the work are successfully completed. Deposits amount to a basic requirement of $25,000 plus a charge of anywhere from 25 cents to $2 on each ton (.9 tonne) of coal mined yearly. A spokesman for Alberta Environment says the average charge is approximately 50 cents per ton. On a mine producing one million tons per year this is a substantial sum. The industry believes that security deposits of this size are guarantees enough that reclamation work will be done well.

Page, in an address to the 1979 British Columbia mine reclamation symposium, summed up the association's view this way:

> For the reclamation of surface mined land, feasible criteria should be established by governments in consultation with the coal industry and with all concerned citizens. The criteria should recognize that each surface mining operation and locality has its own unique characteristics, and they will probably be more effective if they are stated in terms of results and objectives.

In this way, government would look only at proposals and results. The industry would take care of the rest.

The inescapable fact remains, however, that the coal industry's primary interest must be in making money from coal mining. Guidelines from government on reclamation are necessary; history shows that before there were guidelines, adequate reclamation work was not done.

The government's 1976 coal policy states the position clearly: "The government recognizes the importance of Alberta's land resources for agriculture, recreation, forest products and wildlife, and is determined that proper attention be given to these alternative uses in the consideration of coal development projects...Only where the temporary withdrawal of the land from agricultural, recreational or other use for coal development is judged to be in the public interest, and where full reclamation is assured, will the government authorize developments which would cause land disturbance."

So administrators accused of "clinging to the book" may in fact only be administering a policy specifically designed to protect the environment from the "bomb site" catastrophes of former years.

And since, according to the policy, reclamation must be "assured" before approval for a mining project can be given, companies must be expected to do an awful lot of homework.

Dennis Lang, chairman of Alberta Environment's development and reclamation review committee, is sympathetic to some of the problems the industry encounters in reclamation planning. He agrees that it's sometimes difficult to foresee the shape a development will take until mining is actually underway, so planning ahead can pose problems.

But he notes that amendments to reclamation plans can be submitted at any stage of a project; flexibility *is* possible if the company concerned provides all the information it is asked for.

Sometimes, too, what may seem to be minor departures from the original plan--like the substitution of one piece of earthmoving equipment for another--may have critical consequences which must be checked. Where a dragline excavation in a coal seam may have minimal impact, a shovel-and-bucket operation may do considerable surface damage.

Lang agrees, too, that it's difficult sometimes to decide what land use is "better than" or "equal to" the pre-mining situation. But he feels the problem can be solved by working to restore the land to as many capabilities as possible, and leaving options open. Why stop at mere grazing potential, say, for land that could offer more?

He notes, though, that decisions on reclamation for alternate land use are not generally made by government; land use decisions on other than Crown lands rest with local authorities.

And local people, as well as government officials, are involved in inspection of reclamation work in municipal areas for the land conservation and reclamation council. They also participate, as in the case of the Wabamun land use advisory committee, in determining the shape of new developments. It's not only government interests that must be satisfied.

Lang feels the province's reclamation regulations are well in line with those of other countries, and that they'll achieve even greater acceptance as more people come to appreciate the value of land and the need to care for it.

This, he says, is what's happened in Germany, which has a coal-mining history considerably longer than ours. There reclamation has become totally integrated into the mining process. There are no "reclamation experts" or "reclamation costs" because reclamation is seen as inseparable from the rest of the operation.

In Alberta, things are different. Reclamation is new, and is sometimes seen by industry as an "extra"--both in terms of costs and work. In some cases, it has been considered a sort of salvage operation, done after the mining is finished.

But the time is coming here, too, when companies will undertake reclamation work as a matter of course, and integrate the process fully into their plans.

Donald McMann is a journalist in Edmonton.

Gillian Sniatynski

Learning the Hard Way

The lesson of the W.A.C. Bennett Dam.

ALBERTA GOVERNMENT PHOTO

The drama was played out on a huge stage--almost 4,000 square kilometres of north-eastern Alberta, at the western end of Lake Athabasca.

The setting was ecologically unique, and ancient--born thousands of years ago as the Pleistocene ice sheet receded from the lake.

The tragic element in the drama was a dam, built more than 1,000 kilometres from the scene of the action.

The ending? Well, it could with some qualification be called happy. But there was a powerful moral to the story...

The stage was the Peace-Athabasca delta, one of the largest freshwater deltas in the world, and one of the last relatively undisturbed. Made up principally of the deltas of the Peace and Athabasca Rivers, its life evolved in response to the rivers' ebb and flow. Vital to the whole were the floods of June or July, when all the delta's channels and basins were filled with waters from Lake Athabasca.

Lake Athabasca and the other major lakes of the delta are connected to the Peace River by several outlet channels. High spring flows in the Peace caused these channels to back up and in turn cause the lakes to flood over the entire delta area.

This fluctuation of water levels produced an environment in the delta in which plant and animal life achieved a balance dependent on frequent flooding.

The floods fostered the life of the wide sedge meadows, food for the bison herd in Wood Buffalo National Park.

They filled the marshes and perched basins--small depressions in the sediment build-up of the delta--which sheltered migratory waterfowl and those that stayed to breed. Well-filled marshes also housed the delta's muskrat population, the mainstay of delta trappers.

Altogether some 215 species of birds, 45 species of mammals and 20 species of fish had found homes in the delta area.

This delicate and complex ecosystem had survived both natural floods and occasional floodless years. But a man-made disaster called the W.A.C. Bennett Dam almost killed it.

The dam is on the Peace River in British Columbia. Built for the B.C. Hydro and Power Authority on the strength of a 1959 feasibility study, it has the capacity to generate 2,270 megawatts of power (the equivalent of three million horsepower).

When the dam was closed, in December, 1967, the subsequent regulated flow of the Peace reduced water levels and prevented the floods which had formerly fed the delta. Though one floodless summer could be weathered, a succession could not. By 1970, more than 50,000 hectares of mud flats became exposed. The meadow grasses began to give way to other plant forms. The delta was quickly changing from marshland to forest.

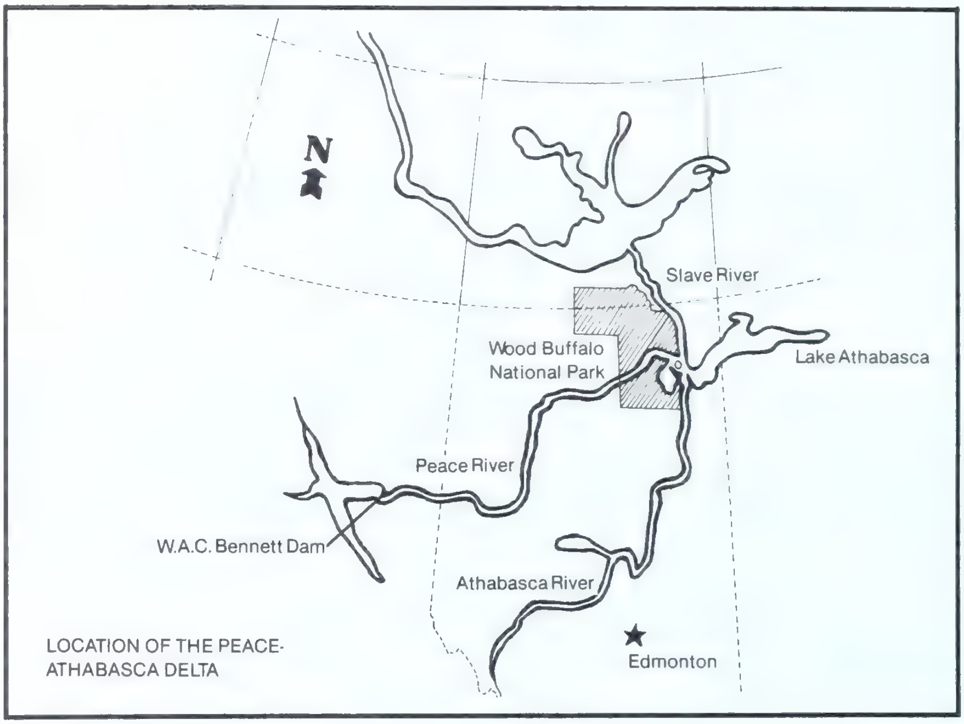
What was happening greatly concerned a group of biologists, who published a brief but alarming report--called, appropriately, Death of a Delta--to air their fears.

The report expressed their concern for "the future of Lake Athabasca and its associated lakes, for the natural resources found therein, and for the 1,300 Cree, Chipewyan and Metis people dependent upon them for a livelihood."

It warned that "what was once a fascinating and varied natural complex of lake and marsh is fast becoming a succession of isolated mud flats whose communicating streams are drying up."

The report also warned of the inevitable consequences of this drying up to the bison herds in Wood Buffalo National Park, to the migratory waterfowl, the muskrat and beaver which had been an important fur resource for the native people, for the fish populations adapted to a regime of annual water level fluctuations.

The warnings took effect. Almost immediately, the three affected governments--Alberta and Saskatchewan, which share Lake Athabasca, and the federal government which controls Wood Buffalo--estab-



LOCATION OF THE PEACE-ATHABASCA DELTA

lished a co-operative interdisciplinary task force. Its mission: To "investigate and report on the extent of low water levels in Lake Athabasca, their cause and their effect on the delta and upon the local people."

The task force took only two years to make its study and report. In 1972, its findings confirmed all earlier fears about the effects of the Bennett dam on the delta.

The sedge meadows--pasture for the bison--were giving way to willows. The perched basins and their shorelines, vital breeding grounds for ducks, were rapidly drying up. (In the years between 1968 and 1971, about 36 per cent of the basin shoreland had disappeared.)

Many of the marshes which had previously supported muskrat houses had become too shallow for the animals to overwinter successfully. In the winter of 1968-69, the delta muskrat catch was 38,000 pelts. Three years later it had dropped to 2,000.

Walleye spawning was found to be seriously affected, since low water levels caused important spawning grounds to dry out.

The task force report urged the building of man-made controls on some of the outflow channels from Lake Athabasca. These would help offset reduced flows in the Peace River by allowing water levels in Lake Athabasca to build up and flood into the delta marshlands again.

With great dispatch, three control structures were built. And then, slowly, delta life began to take on some of its former character.

Dr. Stuart Smith, now director of the Alberta Oil Sands Environmental Research Project, was at the time of the task force report director of fish and wildlife in the then provincial department of lands and forests. He was a prime mover in the Death of a Delta report, and was later chairman of a committee to monitor the effects of the restorative works.

"As far as we can tell the delta has returned to a very similar state to what it was before," he said.

"Somewhere between 65 and 70 per cent of the marshes and perched basins are filled with about the frequency one would expect. Every once in a while we will get a very high water naturally, which will fill everything up--and every year or two there may be low water. But by and large there are no huge changes.

"The delta *is* a little different. Low water is a little higher, high water is a little lower--but to the uninitiated, it looks very much the same."

Prompt action--to say nothing of some $3 million to finance the task force and build the weirs--probably saved the delta. But what is staggering is that, little more than a decade ago, such an environmental catastrophe was not foreseen or prevented.

The lessons of the Bennett dam were painful and costly. But the fact that they were learned is apparent in planning for future hydro developments in Alberta.

After all, environmental concerns don't change the fact that this province does have considerable hydro potential. A 1973 report by the Energy Resources Conservation Board noted that Alberta's five main river basins--the Athabasca, Peace, Slave and North and South Saskatchewan--had an ultimate hydro electric energy potential more than 30 times the amount then being generated in the province. It foresaw the time when rising demands for electric energy and diminishing fossil fuel resources from which to generate it would make hydro development more attractive.

The trend is slowly beginning. In 1978, the board predicted a four-fold increase in provincial hydro requirements (admittedly only from the present one to four per cent of our total energy consumption) by 1991. And two sites--Dunvegan on the Peace River and Mountain Rapids on the Slave River--are now receiving attention as potential major hydro sites.

The Dunvegan site has already been the subject of an extensive feasibility study, authorized by the provincial government.

The study included an environmental impact assessment which concluded that, though water quality, fish resources and river regime would be little affected by the hydro development, there would be some "minor negative impacts" on vegetation and wildlife.

But the key recommendation in the Dunvegan study is that "in view of the findings of this study and since accurate knowledge of other hydro sites would provide flexibility in planning the optimum use of Alberta's remaining hydro resources a detailed feasibility study of the Mountain Rapids site on the Slave River be launched immediately."

That study was given approval last year. About one-third of its $5 million costs will be spent on assessing environmental impacts.

Carl Primus, director of water resource planning for Alberta Environment, notes that it may be four years before the Mountain Rapids study is completed, and a decision--based on comprehensive environmental information--is made. It's a far cry from the Bennett dam situation.

The Bennett dam was built in order that B.C. could have hydro power; other costs were never counted. It seems now that such enormous costs as those others were will never be paid again.

Gillian Sniatynski

What Does the Future Hold?

Our resource riches may have strings attached.

Alberta's resource riches are seen by many as a cause for celebration.

But others have some qualms about the prospect of an energy-boom future here. Coal, tar sands and hydro developments are the coming thing. But what will be their cost to our biological, physical and social environment?

That question is being asked increasingly often by the people whose lifestyles and communities stand to be most affected by the new developments. No longer content simply to sit back and let things happen, they are often working very hard to have their interests taken into account before all the decisions are made.

As chairman of Fort McMurray's town council, and chairman also of a committee which prepared an intervention on the project application, Ted Mason has several concerns about the Alsands oil project proposed for an area some 72 kilometres from Fort McMurray.

What he calls "pressure of people" is his biggest fear--and one well justified by recent history, when the Syncrude development near Fort McMurray gave the town some serious growth problems.

"Probably most of the spin-off we will get (from the Alsands project) will be that we will be an assembly point for a lot of people who are going there to work or coming to the town for their entertainment. There will certainly be an increased activity level in this town."

A sudden population increase also means increased demands for health, education, housing and other services. So, says Mason, municipal expenditures escalate drastically. "We are put to the test all the time."

A deeper concern, and one which Mason extends to the new town proposed for the Alsands project, is the social effect of a flood of new people on community life.

"The influx of people is so heavy that whatever sense of community that existed prior to that is disrupted, and there isn't a cohesive structure in the community as a result. I think that is the kind of thing the new town will feel, pretty much...It's a community of strangers."

The Esso Resources oil project in the Cold Lake area is generating similar concerns.

For Tom Turner, a spokesman for the ad hoc citizens' committee taking part in the recent hearings on the Esso application, the projected influx of some 10,000 people to the area would mean "the disruption of a lifestyle."

His chief fear relates to "the clash of urban and rural values that inevitably takes place in such a situation." The changed environment would create stress, and social services would lag far behind the new demands put on them.

Turner sees the project as having serious economic consequences, too.

"We have seen housing costs escalate drastically in this area. The price of housing in the towns has gone over the heads of the people who live here now and have the lower-paying rural jobs. They can't compete."

What does it all add up to? "There is this feeling on the part of many people that they are beginning to lose control of what is happening. Decisions are being made in the board rooms and not in the communities as they used to be."

Native people in the Cold Lake area see the project as likely to cause disruption of lifestyle at an even more fundamental level.

The Cold Lake Indian reserve has a population of about 1,000, in three locations totalling some 200 square kilometres. The northernmost area of the reserve is about five kilometres from the proposed project site, and, says Cold Lake band chief Marcel Piche, "directly down wind."

Hunting, fishing and berry gathering would all be affected--particularly if the project used water from the lake.

"The traditions and culture of my people are tied to the lake," said Piche. "They feel that, should the province decide to give Esso a permit to draw water from there, it would be in effect like cutting off an arm."

If the project were to go ahead, Piche says the Indian people would seek stringent environmental safeguards, and the assurance of job training and equal employment opportunities.

But he sees even those concessions as a bad bargain.

"Personally I am not ready to give up a lot of traditional ways so I can drive a Cadillac. I would sooner be able to go out in the bush whenever I feel like it, and enjoy what is there."

The Cold Lake band is not alone in its lifestyle crisis. Piche says native people across the north of the province are all being confronted by new resource developments. "We all have the same concerns."

Coal developments proposed further south pose other problems. In many cases the plains coal destined for electric power generation underlies some of the best agricultural land in the province. So a clash of interests is inevitable--and not always easy to resolve.

Alberta Farmer's Advocate Helmut Entrup sees a future scenario where not only coal mines, but also energy corridors, pipelines, coal gasification plants and other industrial complexes will be springing up close to the coal deposits.

"I don't mind that, if we are able to properly reclaim the land," he said. And that may not be easy.

Alberta's farming history is short compared to that of European countries, he says. In terms of reclamation, we have "quite a bit" to learn yet about the soil and about ways to cope with our adverse weather conditions.

Coal mining may also affect a farmer's water supply, says Entrup. Often the coal seam acts as an aquifer, carrying underground water to the farms for domestic and agricultural use. When the coal seam goes, the aquifer is depleted too.

Since coal mining is seen as a temporary use of the land, farmers in most cases have the option of leasing their land or selling outright.

Entrup is concerned that those who sell get fair compensation from the developer.

But he feels that Alberta's compensation system--"the best in Canada"--is structured to ensure that they do.

Erin White, the chairman of COKE (Committee On Keephills Environment) is less enthusiastic.

The committee was set up to safeguard the rights of some 43 families likely to be affected by the new Calgary Power generating station at Keephills, west of Edmonton, and extensions to the nearby Sundance coal mine.

White notes that under the terms of the Surface Rights Act, farmers who choose to sell their land must be given "fair market value" for it. But that may be easier said than done.

White says independent appraisers may differ by up to 30 per cent in their assessment of the land's worth. And he notes that market values will invariably drop anyway when a resource development comes into an area.

Even so, the farmer ready to retire or wanting to make a move may be well satisfied with the price he's offered by the developer. But the younger farmer, who isn't ready to retire, and whose family may have farmed the land for generations before him, has much more at stake. White says there's some resentment that the act doesn't discriminate between such a farmer and "an Edmonton land speculator who doesn't even live on his land."

Productivity ratings are another sore point for the Keephills group. They're made not only to help determine compensation for farmers, but also as a basis for future reclamation plans.

White says an initial study carried out for Calgary Power rated the Keephills land at one ton (.9 tonne) of hay per acre (.4 hectare). "Most people here will plough their hay under when it gets down to about three," he said. The rating for oats was about half actual crop yields.

The Keephills committee is working now with people involved in compensation hearings, to ensure that they fully understand the terms of the act, and know where to go for help in protecting their interests.

LAUREN DALE

Carey Johannesson

In this activity, the committee is not unlike other committees or groups in other areas affected by resource development. It's not that they are necessarily opposed to the new developments; it's simply that they want input into decisions to ensure that their concerns are addressed. In the words of Fort McMurray's Ted Mason: "We know there are going to be problems. We want to be sure our people gain something. I think this community is supportive of the (Alsands) project. But we don't want to get clobbered."

It could be said that the major task of Alberta Environment's environmental assessment division is precisely to ensure that no-one gets "clobbered" by new resource or other developments.

Using a complex procedure called the Environmental Impact Assessment (EIA) system, it works closely with groups like those mentioned.

For any project about which there is environmental concern, an EIA can be required from the developer by the minister of the environment. It must describe in detail the existing environment encompassing the development site, the proposed project, and its likely impacts on present land uses, air, water, geology, soils, vegetation, fauna and human environment.

The EIA system provides for meetings between government and developer through various stages of preparation. All affected government agencies and departments review the EIA to ensure its adequacy before it's sent, with comments and recommendations, to the environment minister and cabinet committee for review.

The EIA's function is to identify problems. If the development is allowed to go ahead, it then outlines the kind of environmental protection plan needed to eliminate or mitigate those problems.

When it's a question of resource development compared to existing land use, "it's always a question of trade-offs--it's never a clear-cut decision," says Carey Johannesson, an EIA co-ordinator with the environmental assessment division.

He sees the EIA as "something that can feed into the decision-making process". And its biggest strength, for him, is that it can create working relationships between all the parties affected by a development.

To be effective, Johannesson says, EIAs have to involve people, to be concerned with the human as well as the biophysical environment. And people are now demanding to be involved.

A condition of cabinet approval of the Keephills power plant and mine expansion development was that a community steering committee be formed under the auspices of Alberta Environment, to monitor local concerns.

The Alsands proposal included plans for a project development agency to deal with community-related problems.

"In the past, we looked at development too narrowly," said Johannesson. "But now, we are looking at the types of concerns people have."

A personal concern of Johannesson is that much of the new resource development will be opening up the presently unsettled north.

"New towns haven't had a very good history in terms of development," he said.

"They have certain characteristics. The people are young and fairly mobile. A lot of people move into the area with great expectations...and expecting the kinds of needs they have will be satisfied. As a result we have started getting a very different kind of person and community...

"In all this it seems to me you can just take it one step further and see that this is what will happen to the province as a whole...

"One of the things we have to start taking a long look at is what sort of a future we want for the province. What sort of province do we want?"

Letters to the Editor

Environment Views welcomes letters pertaining to environmental concerns and/or response to articles in past issues of the magazine. Publication of the various opinions in no way implies endorsement by either Alberta Environment or this magazine. Letters must be signed, and Environment Views reserves the right to edit them for length.

Forest fires--do seismic lines increase the hazard?

ALBERTA GOVERNMENT PHOTO

Debate Misunderstanding

Recently Environment Views published a summary of the debate "That citizen involvement is detrimental to the environment."

Notwithstanding that the audience felt I had carried the debate, a disclaimer was entered by myself after the question had been put to the audience. I believe I clearly stated that civil servants should not control or seriously direct the outcome of serious environmental questions, and that public understanding and involvement was essential.

In view of possible misunderstanding, I would appreciate the opportunity to make clear to your readers the fact that I took the side I did on request. Apparently the force of my arguments carried the debate, but that is not a reflection of my personal convictions.

S.B. Smith,
Program Director, Alberta Oil Sands
Environmental Research Program

Fire Hazard On Seismic Lines

Nine years ago, in the summer of 1970, a forest fire started about 4 1/2 kilometres east of our farm. This fire was not extinguished for three weeks; it damaged about 68 hectares of standing timber.

If the firefighters had been able to get to the blaze, the fire could have been extinguished in about a week, if conditions were favorable. The reason they couldn't was that the area was criss-crossed with seismic lines.

On either side of the lines were the fallen trees that had been cleared out of the way. The trees weren't cut into lengths, nor had they been felled in an orderly fashion; they were left to lie the way they had fallen. Naturally this presented an obstacle to the firefighters and their equipment. If the trees had been properly disposed of, the effects of the fire would have been minimized.

Recently seismic crews have come once again into our area, and once again they have left the trees in the same disorderly fashion. Perhaps it will take a forest fire that will damage millions of hectares and cost hundreds of thousands of dollars to put out, to make the (seismic crew) organizers realize that something is wrong in their set-up.

Randy Senner
Spirit River

Industry Efforts Effective

We would like to draw your attention to the January edition of Environment Views. In the article entitled "The Toll of the Tail Pipe" (page 12, second column, 3rd paragraph) the following statement was made: "Almost all of the carbon monoxide in Calgary comes from motor vehicles, while the major source in Edmonton is industry, mainly the oil refineries east of the city."

This statement was true in 1973 when Alberta Environment undertook their last carbon monoxide inventory study. Today, however, the major source of carbon monoxide in Edmonton is not industry, but the automobile.

The 1973 Alberta Environment carbon monoxide inventory estimated that 58 per cent of carbon monoxide emissions in Edmonton resulted from industrial sources. Since that time, the installation of pollution abatement equipment at the Imperial Oil Ltd. refinery and the Gulf Oil Canada Ltd. refinery has reduced the emission from these refineries by more than 98 per cent. This resulted in a significant reduction in the overall carbon monoxide emission in the east Edmonton area. On a comparative basis, the percentage of carbon monoxide emitted from industrial sources has been reduced from 58 per cent in 1973 to less than 15 per cent in 1979.

We thought you would like to know of this significant contribution which industry has made in controlling carbon monoxide emissions in Edmonton.

R.J. Woznow
Chairman, Strathcona Industrial Association
Technical Committee

If undelivered, return to:

Environment Views
Alberta Environment
9820 - 106 Street
Edmonton, Alberta T5K 2J6

ENVIRONMENT UPDATE

Forest Damage Described

A report prepared by the Environment Council of Alberta for the provincial government indicates that oil and gas exploration is taking a heavy toll of the province's forests.

The report notes that there are 376,000 kilometres of seismic lines in the province--which have destroyed 2,340 square kilometres of the province's 345,800 square kilometres of forest.

These figures don't include areas where trees have been cut for well sites, access roads, or oil sands mining in northeastern Alberta.

The report says the seismic lines--the most environmentally destructive part of petroleum operations--also promote harassment of game, overhunting, overfishing, and uncontrolled use of four-wheel-drive vehicles.

The report predicts that forest damage will increase with the development of heavy oil projects, and that, at the extreme, the land will be totally lost to forestry, wildlife and recreational use.

It calls for hearings into the impact of the petroleum industry on forests, and also suggests narrowing of seismic lines and pipeline rights-of-way and encouraging long-term planning.

Protection Measures Included

Environmental protection measures are included in a $195-million expansion program planned for the commercial oil sands operation owned by Great Canadian Oil Sands Ltd. GCOS will spend $26 million on the installation of electrostatic precipitators to reduce particulate emissions. It will also add a gas-fired boiler to its existing coke-fired boilers.

Container Program Expanded

Alberta Environment has expanded its container return program to include non-carbonated soft drink cans. Consumers get a two-cent return on the cans. Fruit and vegetable juice containers are not included in the program.

ALBERTA GOVERNMENT PHOTO

Concern Over Drilling Plans

The Alberta Wilderness Association has expressed its concern, in letters to Premier Lougheed and the department of energy and natural resources, about two proposed drilling operations in protected zones of the Eastern Slopes.

The first concerns an exploratory gas well which the association says Shell Canada Resources Ltd. is planning within the Prime Protection Zone of the South Castle River drainage, apparently near Waterton National Park. According to Eastern Slopes zoning policy, no exploration or development is to be permitted in such a zone.

The second concerns a proposal by CDC Oil and Gas Ltd. to drill "at or near an old well site in the headwaters of the Blackstone River, in an area zoned 'critical wildlife' (Zone 2) and within just a few miles of the 'prime protection zone' (Zone 1)."

Hearing Completed

The Energy Resources Conservation Board has completed its hearing into the propane pipeline accident which forced the evacuation of some 20,000 residents of the Edmonton sub-division of Mill Woods March 2. A decision on the hearing is not expected before mid-summer.

New Course Offered

The University of Alberta philosophy department is offering a course in Philosophy of the Environment in the first term of the 1979-80 academic year.

The course will explore the philosophical roots of the "environmental crisis". It will deal with concepts like "progress", "freedom", "property", "science" and "technology" to understand the nature of the crisis and courses of action aimed at overcoming it. Ideas such as "struggle against nature" and "mastery over nature" will also be dealt with.

Petition Presented

Representatives of the Alberta Wilderness Association and the Alberta Fish and Game Association have presented a petition to Bud Miller, associate minister of public lands and wildlife, calling on the government to protect the Willmore Wilderness. The petition contained 35,000 signatures.

If you have a short news item of province-wide interest you'd like to contribute to Environment Update, please send it to the editor at the address on the Contents page. The editor reserves the right to select and edit the items.